# NEWS IN PERSPECTIVE

*DECEMBER 1, 1961*

## MANAGEMENT VIEW

INADEQUATE MANAGEMENT DEVELOPMENT lanning in the utility industry is iscouraging large numbers of young peole, in the view of Montana Power Co.'s res. J. E. Corette. Too many young peole are depressed because their companies o not have adequate programs for locatng, recognizing, training, and developng management personnel for better jobs, e told the PCEA Conference in Honolulu ecently.

THE IMPACT OF POLITICS upon our lives annot be escaped, (so) the only intellient course is for us to exert such nfluence as we can in behalf of the merican System and all it stands for. he president of the Wisconsin Utilities ssociation, M. E. Juhl (who is also xecutive V-P of Lake Superior Dist. ower Co.) urged delegates to a recent ssociation conference to encourage all tility company employees "to become nlightened participants in the affairs f the political party of their choice . . . in party caucuses, in nominating onventions, in campaigns . . ."

QUITTING APPLIANCE SALES—Two more tilities to do it recently are Consumers ublic Power Dist. (Neb.) and the Iowa . & L. Co. Required by a new state law o quit selling appliances with a retail alue of more than $50 by the end of '62, PPD decided to aim for April 1 and to ut into effect a new load promotion proram as soon as possible, according to en. Mgr. R. L. Schacht. And, for the owa company, abandonment of its applince business means an intensified servce policy . . . "for now, that is the nly thing we have to sell," notes Pres. . Paul Thompson, who announced in conection with the dedication of the utilty's remodeled headquarters building hat "we are committing ourselves to coninuing and exciting exhibitions and isplays from now on."

FIRMING MISSOURI RIVER HYDRO capacity ould increase Federal power sales in he Eastern Missouri River Basin by more han $10-million annually, 14 power supliers in the area claim. In a recent offer, they indicated that about a 50-percent increase in firm power for preference customers would become available without additional capital investment by the government—"Savings . . . of prime importance at this time when our country's defense needs are so great," in the belief of Otter Tail Power Co. Pres. Albert V. Hartl.

## ECONOMIC CLIMATE

FEDERAL BUDGET DEFICIT of $6.9-billion—and likely to grow—will be a major economic stimulant. But Administration advisers on economic policy—trying to cope with a thorny political issue—have come up with a new look at the federal budget. Needless to say, it's reassuring. As they have it figured, the $6.9-billion deficit in the administrative budget ($8.4-billion in the consolidated cash budget) washes down to a mere $200-million red ink figure when the budget is computed on the basis of national income accounts.

BASIS FOR DIFFERENCES is the method of calculation. The administrative budget comprises about 80% of federal receipts and payments. The cash budget includes these omitted items. The new approach looks at the budget in terms of the national income accounts, designed to show the effect of federal activities on current incomes and production. This budget is based on accrued receipts and expenditures, not cash income and outflow. It excludes balance sheet transactions and speeds the crediting, for budget purposes, of the government's income, particularly for corporate taxes which lag about 6 months under usual methods of computation.

FIGURED THIS WAY, there will be a federal deficit of $200-million in fiscal 1962. It will not, obviously, be a significant factor in a Gross National Product that will exceed $525-billion. Its expansionary influence would be small, and it would have a negligible inflationary impact, particularly in the light of a continuing high unemployment rate and surplus production capacity in most lines. Calculating in national income terms, the budget can be shown to have a decreasing rate of deficit, and early in calendar 1962 a small surplus will appear. It will then start to have a net restraining influence on the national economy.

## WASHINGTON INFLUENCE

UTILITY COOPERATION is "expected and invited" in interconnecting federal systems not only with each other but with public and private utilities, according to Reclamation chief Dominy. The intense public Congressional fight over the issue (which he describes as "basic to Reclamation") was in the long run beneficial "in developing the true facts." He says "it would be wasteful and foolish not to develop every river project to its maximum capacity and benefit rather than to meet the single purpose demand of the moment." Dominy claimed to have "more than 50 additional planning reports" that will be ready for Congress before the next election. The Reclamation head also criticized the standards for figuring benefit-cost ratios and said the 50-year period was unrealistic. Dominy promises speed in reappraising Middle Snake and praised "reaffirmation" of the importance of preference customers.

MARKETING AGENCIES of the Interior Department have "utility responsibility," says Assistant Secretary Holum, adding that the government should be the "pace-setters" in efficiency and service. Federal power marketing responsibilities, he says, are "a challenging and exciting opportunity." Holum has suggested creation of a joint transmission system, starting with the Reclamation system as it will exist in 1965, for which preference customers will pay a proportionate share based on the use made by each.

SPENDING CUTBACK asked of agencies by the President is not likely to have major impact on power programs. REA, a spokesman says, doesn't think "reimbursable loans are an expense." Budget Director Bell concedes that REA lending has a "priority." And Assistant Interior Secretary Holum confirms that "'Partnership' (which proposes to sell falling water to profit utilities at federal projects) ceased to exist as a national policy on January 20th of this year." This year's public works bill provided for seven new multi-purpose water development projects and increased funds for investigations of projects. And it seems clear that Administrtaion blessing next year will go to construction of power facilities at the AEC plant in Hanford, Wash., and to Burns Creek development.

CANADIAN TREATY concerning the Columbia River Basin seems up in the air. Interior Under Secretary Carr thinks ratification of the pact is "now becoming urgent." But disputes within Canada concerning sales of power to the U. S. seem likely to delay indefinitely Canadian ratification of the treaty. If Canada does not validate the pact—which took 16 years to negotiate—the Interior Department estimates it will have to spend an extra $560-million to obtain the same amount of power and flood control benefits that it hoped for with Canadian participation.

RAPID GROWTH in electric heating is "one of the most encouraging market developments for the coal industry in recent years," says the National Coal Policy Conference. It anticipates that 2.2-million homes will be heated by electricity by 1965 and 29-million by 1980. With each such home using about 20,000 kwh a year and coal generating 60-percent of the power, the coal group sees a market for several hundred million more tons of coal a year.

REPORTS TO STOCKHOLDERS are not subject to FPC, according to Presiding Examiner Samuel Binder. He found, however, that Appalachian Power Co. violated the Commission's Uniform System of Accounts although he was not persuaded it was guilty of "wilful and knowing" violations. The company has consistently argued that it had an option, under FPC rules, to keep its books on a "flow through" basis for the Commission although it used deferred income tax accounting for the state regulatory commission and other purposes. In distinuishing between reports to FPC and eports to shareholders, Binder said the ormer enabled the agency to carry out ts functions while the latter informed nvestors of the company's financial osition.

HYDRO CAPACITY will be upped more han 1.8-million kw as a result of Rec- amation's 1962 construction program. ther results include an ultimate gain f about 44.9-million acre-feet of eservoir storage capacity, full irriga- ion water for 1.4-million acres and upplemental water for 836,000 acres of armland. Under the Reclamation pro- ram, according to Commissioner Dominy, re seven new construction starts, con- inuing work on 16 other projects, and arious units of existing projects and ork with local water-user groups. iscal 1962 construction costs are 271.5-million.

PUMPED-BACK STORAGE POTENTIAL will e studied by the Reclamation Bureau, onneville, SWPA, and SEPA. In finding ut how federal reservoirs can use low- ost, off-peak pumping energy to get more ydro peaking capacity, each area will ollect its own basic load and power esource data. The Interior Department ill review, coordinate and set guide- ines to be followed as the studies rogress. Reclamation will concentrate n CVP in California and Colorado River torage in the five inter-mountain tates. Secretary Udall points out the alue of peaking capacity to private tilities with primary responsibility for firm power supply. Udall also hopes o find ways to improve power generation nd power revenues of Interior's market- ng agencies.

POWER INTEGRATION STUDY made by 14 id-west utilities will be examined by nterior before meeting with the com- anies to discuss possible linking of heir thermal systems and federal hydro- ower in the Missouri Basin. Assistant ecretary Holum, in a letter to Northern tates Power Co., asked that the inter- sts of preference customers be recog- ized by inviting representatives from he Mid-West Electric Consumers Association. Holum was president of the co-op group before taking a job on the New Frontier. Although no longer with the co-ops, Holum used a favorite line when he told an REA group: "My responsibilities have changed; my viewpoints have not."

ADAMANT POSITION apparently was taken by the Interior Department in discussing with an engineering committee of the Upper Colorado River Commission the question of Colorado River Storage Project transmission lines. Interior Secretary Carr pointed out that the Department would ". . . conduct negotiations with all power suppliers in the area with respect to interconnections and wheeling agreements—beyond the basic back-bone system—which are in the national interest and provide mutual advantage to all parties concerned." Commission aim is apparently to maintain the highest practicable revenue level in the Basin fund.

REA WILL FIGHT for the rights of co-ops when they dispute territorial rights with investor-owned utilities. Assistant Administrator Wood has stated this firmly, adding the comment that rural areas are being added to towns and cities "at the instigation of the power companies and trying to take away from the rural systems consumers who have been on their lines for years." He sees state legislation as the best solution to this problem. (Recently, Interior's Kenneth Holum said opposition to co-op expansion gave private utilities' appearance of "a ten-ton elephant crying in fear of being eaten by a mouse.")

GENERATING LOAN POLICY of REA has been forcefully stated by Administrator Clapp. "In considering applications for new REA-financed generation and transmission facilities, REA must consider the future security and effectiveness" of the co-ops to be served. Clapp adds that "reliance for wholesale power supply on a utility that at the same time seeks to serve at retail the territory of its wholesale customers" jeopardizes the co-op system. "This jeopardy becomes too great to tolerate" when there is "persistent and demonstrated hostility" by the power supplier. In these circumstances, REA's future security and effectiveness requires "a source of power completely dedicated to their needs," he says.

## INDUSTRY SIFTINGS

RISING REVENUE RECORDS are being reported by more and more companies which experienced third quarter kwh sales increases over '60 figures. Among many utilities in such an improving position are: Central Hudson G. & E. Co., Commonwealth Edison, Dayton P. & L. Co., Delaware P. & L. Co., Wisconsin P. & L. Co. (Among 14 electric utilities in 195 representative growth stocks "slated for above-average earnings gains" by United Investment Report, three quality-rated "high grade" are: American Elect. Power, Idaho Power and Virginia Elect. & Power.)

BIG BOOST IN WINTER PEAK, for December of '61, is expected to reach 144.1-million kw, up 8.3-percent over the 1960 high. For the total electric utility industry, last summer's peak load was 140.9-million kw—6.1-percent higher than the comparable '60 peak, according to the most recent EEI semi-annual electric power survey.

IDAHO'S RECORD HV CARRIER—longest wood-pole line in the U. S. equipped with new style "bundled" conductors—will enable the Idaho Power Co. to deliver 40-percent more electricity than with a standard conductor, noted V-P J. F. Emery. Built by the utility's own mobile crew, it has more than 1,500 H-frame wood towers, 17 steel towers at either end . . . and 1,140 miles of bundled conductor, 380 miles of "shield" wire for protection against lightning.

OFFSET TO RISING OPERATING COSTS in New England is coordination among interconnected investor-owned utilities, says Pres. Wm. Webster, of the New England Electric System. "The mutually beneficial transfer of bulk power between utilities will result in savings otherwise not possible," he said, in announcing that the Boston Edison Co. will start construction in '62 on a 340,000-kw unit, largest in New England.

GOVERNMENT-BUSINESS HOSTILITY, reported to be growing, is alarming, in the opinion of Mark W. Cresap, president of Westinghouse. In recent remarks for the Harvard Business School Club, he called for a re-examination of attitudes . . . (because) "government is not the enemy of business; business is not the enemy of government. There is only one enemy, and we know who it is." (About the antitrust convictions in the electrical industry, he observed that the government was merely carrying out its responsibility under the law. A great lesson has been learned and corrective measures have been instituted, he said.)

UNIVERSAL PRESSURE BOILERS of the once-through type are being recommended by Babcock & Wilcox for all electric utility applications requiring turbine throttle pressures of 2000-psi and higher—"a policy unique in the boiler industry because it literally endorses a single boiler design concept," according to the B&W announcement. (For Con Ed's record-breaking million-kw turbine generator, Combustion Engineering will supply the mammoth boiler, the utility's Chairman H. C. Forbes has announced.)

COMPANY'S RIGHT OF EXTENSION of service to customers in an area annexed to a municipality served by the utility under franchise was recently upheld by a notable decision of the Supreme Court of Alabama. The court ruled that the Clark-Washington Elect. Membership Corp. could not enjoin the Alabama Power Co. from extending such service.

FIRST J-75 JET ENGINE-POWERED electrical generator using natural gas as a fuel is being installed by the Delaware P. & L. Co. for peak load service in the Wilmington area. The 13,500 kw unit is to be in service by late '62.

NEW PG&E COMPUTER GROUP has been organized to develop a program for increasing the application of computer technology for engineering and operating purposes . . . cooperating with other company departments in "identifying, analyzing and solving complex problems of an engineering, scientific, operating or economic nature by the use of computers."

EL&P
ELECTRIC LIGHT AND POWER
THE MAGAZINE OF ELECTRIC-UTILITY TECHNOLOGY

# STORED-WATER SPACE HEATING IS PRACTICAL WHEN USING OFF-PEAK POWER

*Tests on various off-peak-heating arrangements have proven that this concept can be beneficial to utilities and customers.*

By STANLEY B. TUPPER, Market Development Division,
Bell & Gossett Co., and
RAYMOND J. VERTOVEC, Engineer, Space Heating Department,
Commonwealth Edison Co.

LTHOUGH THE OFF-PEAK,
- stored-water system is far from
ng a new concept, no serious at-
npt has been made in the U. S.
provide design criteria or to de-
op a marketable off-peak con-
pt. One reason that this concept
; not been developed is because
h the electric and the hydronic
ustries have lacked the knowl-
ge and experience of each other
the past. However, there has
n a decided move recently to-
rd cooperation between these
) industries.

### Utility Promotion

'o investigate the use of off-peak
ver for space heating, Common-
alth Edison is using an experi-
ntal off-peak rate of 1.05¢ per
h, which is 34 percent less than
ir present space-heating rate of 1.6¢ per kwh. The utility benefits of a controlled load are obvious—kwh can be added to the valley in their daily load curve without any additional investment in generating equipment. This load would also improve system load factor, which would bring a greater return on capital investment. The problem is to provide a means of obtaining such a load.

### Development

The first step in the development of a practical system is to select storage and distribution temperatures. For a storage system to attain maximum economy it should be designed as closely to its upper temperature limits as practical.

Most components for hydronic systems are available at 30- and 125-psig pressures. Temperature limits at these pressures have been selected as 250 F and 325 F, respectively, to prevent boiling.

The space-heat-distribution means selected should be at as low a temperature as possible, in order to keep storage volume to a minimum. This will enable each gallon of stored water to be used to maximum advantage. The heat-distribution systems which best lend themselves to low water temperatures are radiant panels, air coils, fancoil units and high-mass cast-iron radiation. The latter, while not extensively used in present-day systems, makes up a large share of what may someday be a large conversion market.

After selecting the desired water temperature and pressure, the next step in developing the design is to determine storage volume and heater capacity. It has long been recognized that differences exist between actual and calculated heat requirements. Some of these differences are due to the methods of calculation, while some are the result of internal heat gains, solar radiation, heat storage and others.

### Max Demand vs Installed Capacity

A sampling of some 30 electric-heated test homes in the Chicago area indicated that maximum demand does not exceed 0.7 of the installed capacity. Since the major portion of heat gains occur during daylight hours it was felt that the stored heat required could be reduced even beyond the 0.7 figure. In sizing storage requirements, therefore, the Btu's stored were selected at two-thirds of the calculated heat loss. Most of the test systems installed in the Chicago area were designed on the basis of a 13-hr on-peak (stored-heat use) period with an 11 hr off-peak (stored heat recovery) period.

### Test Systems

Assuming a residence had a design heat loss of 45,000 Btu, 380 gal of storage would be required—see Table I. Note: Heater capacity must be large enough to recover the storage for the on-peak time and at the same time provide the instantaneous heat loss of the structure during the off-peak hours.

For the assumed residence with 45,000 Btu heat loss, 24 kw of heater capacity would be selected (Table II). In terms of potential heating capacity for a 24-hr period com-

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or's Note: This is an adaption of a paper
ented by the authors at the 1961 Ameri-
Power Conference.

### TABLE I

**STORAGE VOLUME REQUIRED FOR RESIDENCE WITH 45,000 BTU HEAT LOSS**

Maximum Stored Water Temperature = 250 F
Minimum Stored Water Temperature = 120 F
Temperature Difference = 130 F
Btu per gallon of stored water =
  7.9 #/gal (@ 250F) x 130 = 1030 Btu/gal
Btu stored for 13 hours =
  ⅔ x 45,000 x 13 = 390,000 Btu
Gallons of storage required =
  390,000 Btu/1030 Btu/gal = 380 gal

### TABLE II

**HEATER CAPACITY REQUIRED FOR RESIDENCE WITH 45,000 BTU HEAT LOSS**

Btu stored for 13 hrs = 390,000

Btu for 11 hrs instantaneous heat loss
  11 x 45,000 = 495,000

Required input for 11 hrs = 885,000

Required input per hr = 885,000/11 = 80,500

Required kw per hr = 80,500 Btu/3,413 Btu/kw = 23.6 kw

pared to a conventional system this represents a ratio of .82 to 1.0:

13 hrs x ⅔ design loss= 8.67
11 hrs x full design loss=11.00
————
19.67
19.67/24 hrs = .82

Consideration should be given for heat stored in the mass of the storage and distribution systems. This has been calculated in some cases to be sufficient to provide the heat requirement of the structure for one hour on a design day.

The first of the recent off-peak test systems installed in the Chicago area was designed to replace a gas-fired furnace in an existing residence. The design criteria were: 325 F maximum stored-water temperature, 120 F system-water temperature, 125-psig relief pressure and 11-hr off-peak heating. A schematic of the system is shown in Fig. 1.

This system uses two 180-gal storage tanks each equipped with 15 kw of immersion elements—three five-kw elements per tank. A 100-gal, air-charged compression tank allows the system to reach the 325 F final temperature at a pressure of 100 psig. A fan and hotwater coil in the existing duct work replaced the furnace.

The water circulating system is designed on the basis of a primary and secondary pumping arrangement. The primary pump circulates water through the air coil while the secondary pump blends the high temperature storage water with the coil return water to give the required primary supply water temperature.

Upon a call for heat by the room thermostat, both the primary and secondary pumps are started. The primary pump remains operative until the thermostat is satisfied, while the secondary pump cycles on a limit control in the primary circuit. These pumps and the blower must be able to operate at any time and therefore are metered with the other household loads. A time clock, within the separate off-peak meter, controls 30-amp, double-pole mercury switches that supply power to the elements. They remain closed until opened by the time clock, by tank high-temperature-limit-controls or by outdoor ambistats. Storage temperature is controlled by line-voltage thermostats on each element. This permits any combination of storage temperature and heating capacity under varying weather conditions. This was the first test system, and the control installation was made rather complex intentionally for versatility in obtaining information.

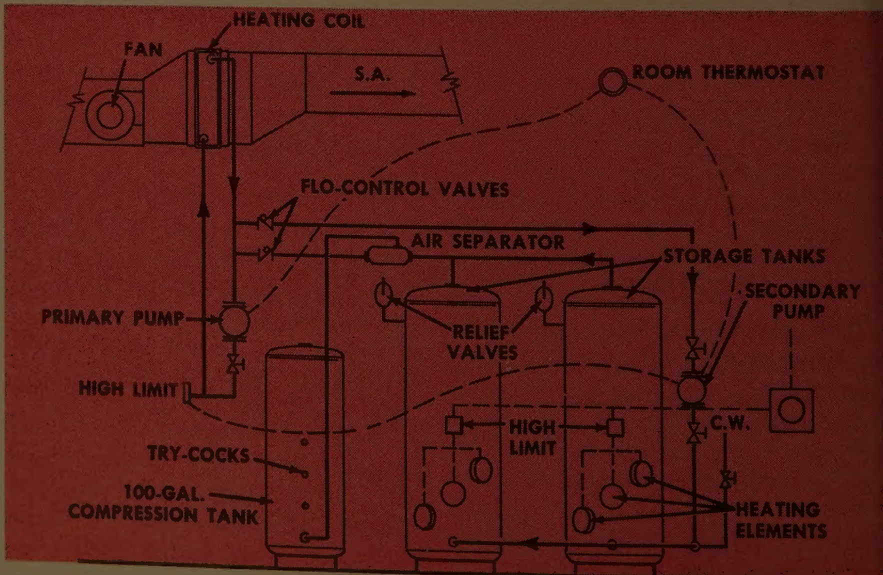
This first system was installed in a ranch-style home—with one floor and a heated basement. The first floor and basement each comprise an area of 1450 sq ft. The heat los of the structure was calculated t be approximately 51,000 Btu. Operating cost for one yr (6750 degree days) has been approximately $265 The cost of heating the same residence with natural gas average about $180.

Primary consideration was give to performance rather than investment costs. However, this first design indicated that there were means available for reducing investment costs without sacrificin performance.

In an effort to reduce investmen costs, a second system was designe using the upper part of each storage tank for expansion. The equipment was installed in a garag along the wall common with th house. A sheetrock enclosure wa built around the storage tanks an poured full of loose insulation.

This storage system showed a improvement in investment cost but indicated that further reduc

Fig. 1—Off-peak test system that was designed to replace a gas-fired furnace in an existing residence. A fan and hot-water coil were placed in the existing duct work.



ns could be made. Performance d operating costs have been bet- than anticipated.

Another experimental system re- iced an oil-fired boiler (Fig. 2). e home was equipped with a avity hot-water system with cast- n radiators. This storage system s designed for a 125-psig work- ; pressure and required an inter- ediate heat exchanger between e storage and radiation systems e to the 30-psig working pressure the radiators.

In an effort to reduce storage ca- city and investment cost, both -peak (lower) and on-peak (up- r) elements were installed. The -peak elements are controlled om outdoor temperature. By de- gning the system for an outdoor mperature of +10F rather than 10F, a $400-savings was made th only a $15 per yr increase in erating cost. The control system r the on-peak elements was de- gned to operate only if both the tdoor temperature and stored- ater temperature are below their spective control settings. These ements cannot operate during the -peak period.

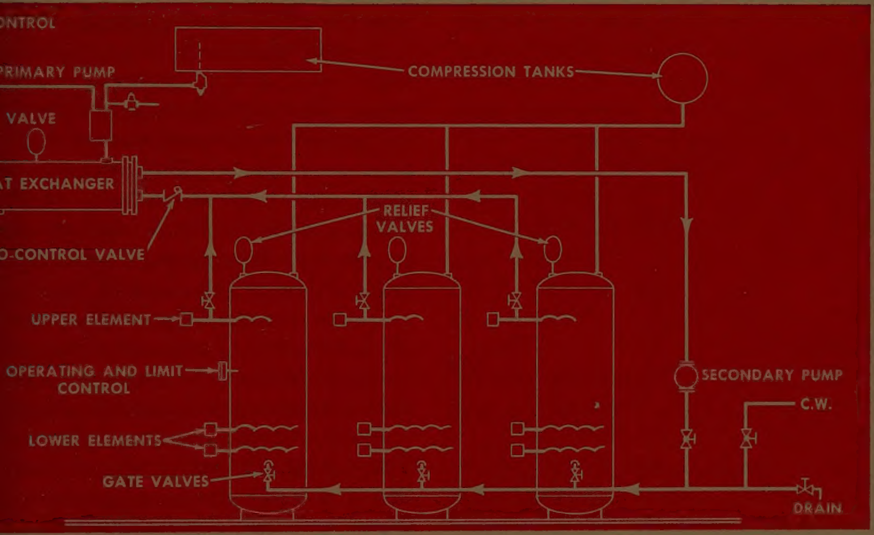


**Fig. 2—An experimental off-peak system that replaced an oil-fired boiler in a home equipped with a gravity-hot-water system.**

This system uses three 120-gal rage tanks, each with 10 kw of -peak elements and 2 kw of on- ak elements. The upper part of e storage tanks is used for expan- on to reduce compression tank e.

A high temperature asbestos- neral wool insulation with a latex binder was sprayed on the storage tanks. Where appearance is not important, this is quite economical.

To obtain comparative investment cost, another system was designed with a remote heater. The control system was much simpler because duplication was eliminated. Another consideration in the development of this type of system is it's flexibility in the location of system components. The heater can be located close to the electric service entrance and the storage vessels at any remote or inaccessible location.

The storage-water pump operates continuously during the off-peak to insure that the entire storage volume is at the required temperature at the start of the on-peak time period. Without affecting performance, investment costs for this type of system were improved.

Another arrangement was used where all the heating elements were placed in one tank. This tank then became a combination storage tank and heater, while the other tanks served only as storage vessels. This was done to reduce installation costs and to permit operating with varying amounts of storage.

The off-peak time was extended to 16 hrs for this arrangement and the heater elements were designed to supply only the instantaneous heat loss of the structure.

This may be very practical method of providing an economical system from the customer investment and operating standpoint while still retaining considerable utility benefit. In areas which have very sharp peaks of relatively short duration, this method of peak shaving may be advantageous.

Although these designs were considered marginal, operation during this past heating season has indicated that the designs appear conservative. Even the arrangement that was designed for +10F satisfied the heating requirements during December when the daily mean temperature was —4F and temperatures down to —17F were experienced. It is hoped that these test systems will aid in the development of better design criteria for future systems.

## Interest Growing

Interest in the off-peak concept is noticeably growing, both in the electric and in the hydronics industries. During the past year, the authors have both asked and been asked some questions they feel should be explored more fully. These questions and the authors' comments follow:

1. IS THE OFF-PEAK HEATING CONCEPT PRACTICAL?

The ability of an off-peak system to provide comfort and customer satisfaction has been proven. Investment cost reductions are needed to make the system economically appealing. Operating costs with existing rates are good, but may need to be improved.

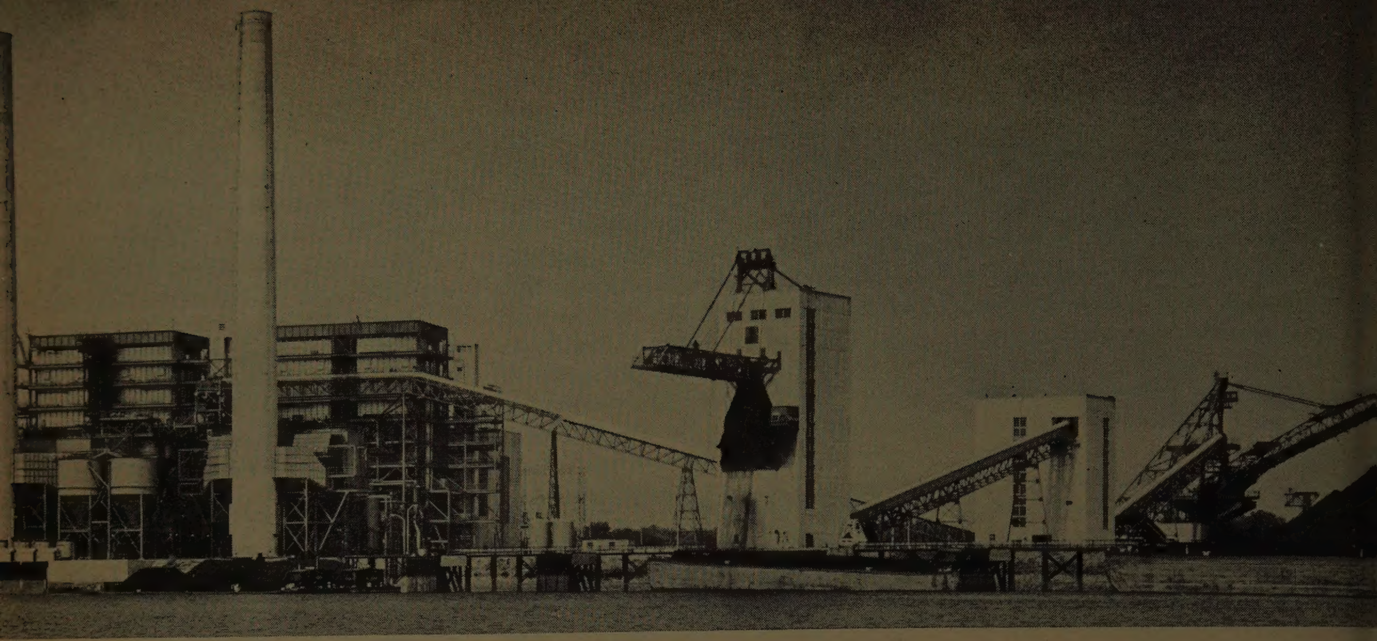
Utility benefits are apparent now, but looking to the future may be even greater. The trend to larger size generating units increases the problem of efficiently varying system loading. If capacity costs spiral upward or energy costs decrease, the sale of off-peak energy becomes even more beneficial.

Looking to the future, methods of control which would allow the utilities to govern a large block of off-peak loading at their descretion appear to have good utility benefit. This is a question which will take further evaluation, however, to determine its practicability.

2. WHAT ABOUT OTHER STORAGE MEDIA?

Many other materials for heat storage have been and are being considered. Several other types of

*(Continued on page 68)*



Mercer Generating Station, as seen from the Delaware River.

# *Mercer* GENERATING STATION DESIG

SIGNIFICANT DEPARTURES from previous design practices on the Public Service Electric and Gas Company system lend particular interest to the Company's new Mercer Generating Station.

Located on the Delaware River south of Trenton, this $110-million plant has two identical 320-mw, cross-compound, 3600/3600-rmp units. Steam conditions are 2400 psig and 1100 F, with reheating to 1050 F.

Generators and associated shaft-driven boiler feed pumps are located outdoors; turbines indoors.

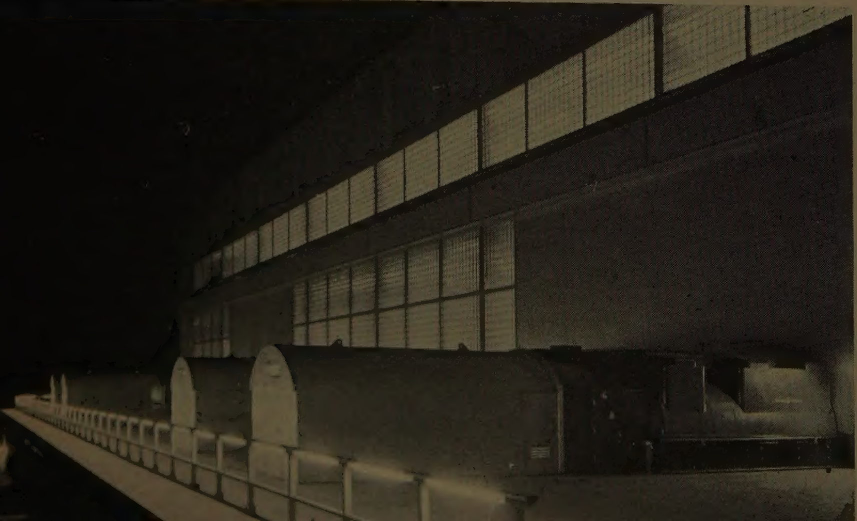
Each 320-mw is provided with two half-capacity boiler feed pumps (driven from extensions of the generator shafts), and one quarter-capacity motor-driven pump.

A control console is provided fo each unit in the two-unit control room. The combustion, feedwater, and steam-temperature control systems are all electric. Except for feedwater and superheat control valves (which have an electro-pneumatic converter), all boiler-control drives are electric.

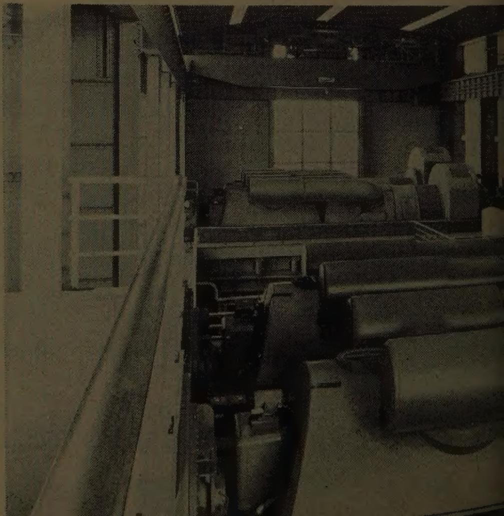
Closed-circuit TV provides continuous viewing of chimney emission furnace burner conditions, boiler gage glasses, and the entrance gate

A data logger continuously scans 600 thermo-couple temperatures and a digital, stored-program, synchronous computer with a 16,000

Night view of the generator deck of the Mercer Station.



Turbine room of the Mercer Station.



*blic Service Electric and
s Company's new $110-mil-
n, 640-mw Mercer steam-
ctric station incorporates
merous advanced-design
ıcepts.*

# UNIQUE

rd capacity calculates and prints
station-performance reports for
ekly, monthly, quarterly, and
arly periods.

Jnusually extensive use is made
aluminum throughout this proj-
. Applications include a 50-ton
door semi-gantry crane, alumi-
n building panels, aluminum
h, outdoor walkway gratings,
nd-rails incorporating deck illu-
nation, coal-conveyor covers,
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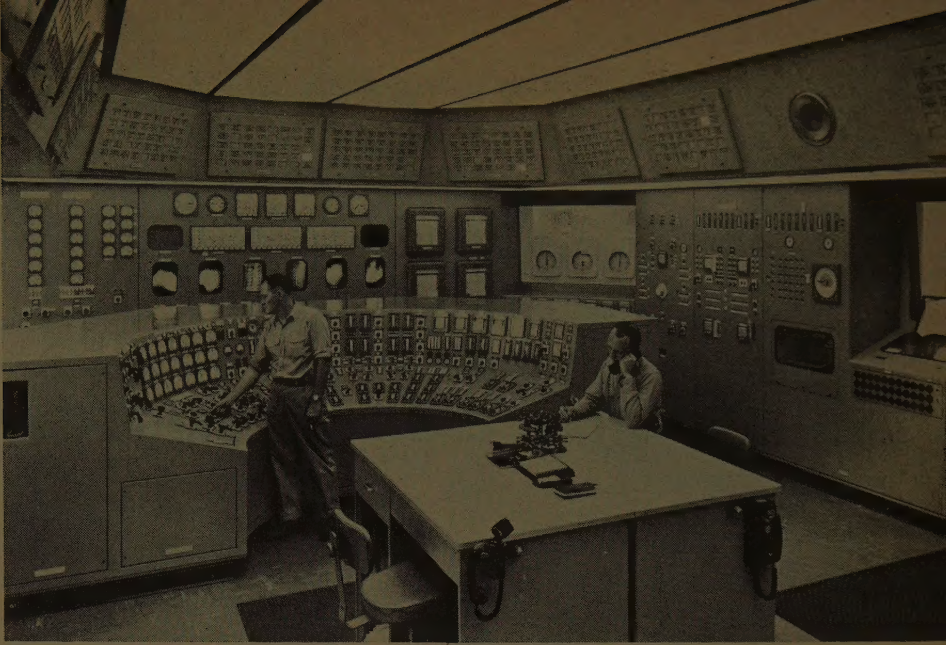
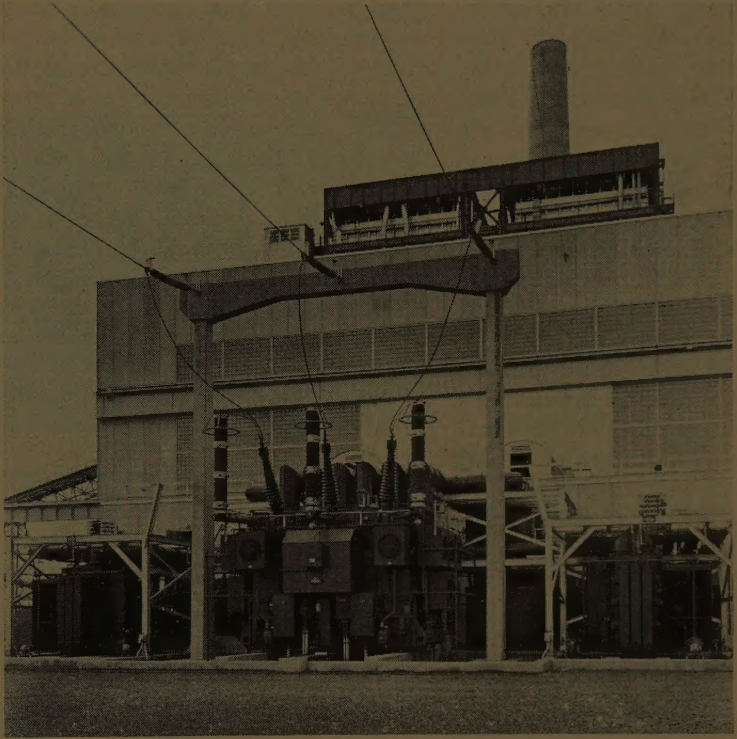
'oday, Public Service has a total
erating capacity of about 3¾-
lion kw. By 1965, the Company
l have approximately four times
capacity it had in 1945.

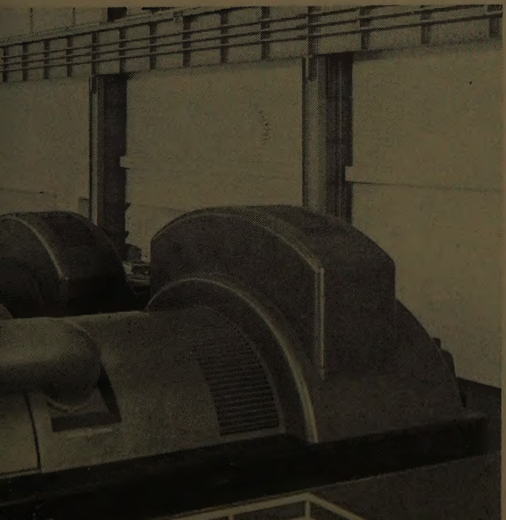


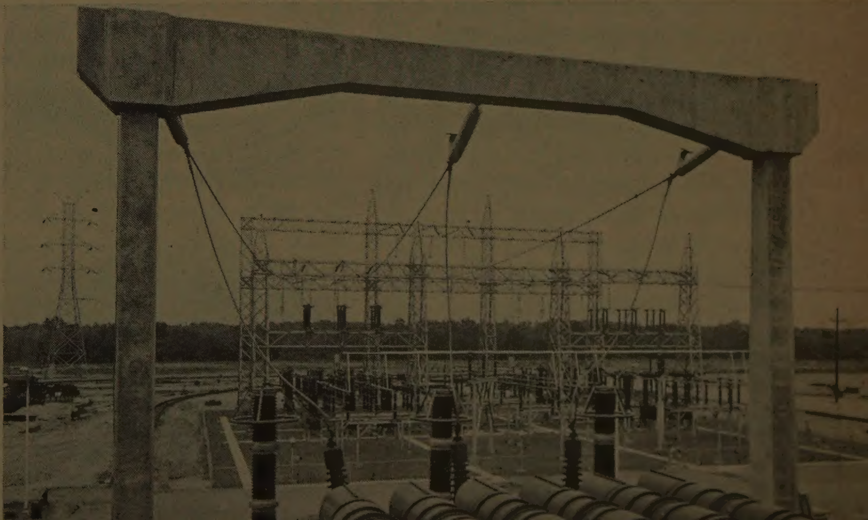
**Control console for one of the two Mercer units.**

**One of the two 3-phase, 340-mva, 17.5/230-kv main transformers installed at the Mercer plant.**



**Outdoor switchyard with prestressed concrete terminal structure in foreground (an innovation for this utility); note isolated phase bus.**





*Here are some of the methods available to utilities for controlling or reducing benefit plan costs.*

# HOW UTILITIES CAN CUT BENEFIT PLAN COSTS

By C. CHARLES BURNS, Consultant,
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New York, N.Y.

ON ALL SIDES there is a call these days for economy in the conduct of the nation's business affairs. Labor is asked to increase its productivity as management taps its resources of ingenuity and imagination to wring profits out of a hesitant economy. The focus of the cost saving drive has centered particularly on the field of employee compensation and that means that employee benefit plan costs, closely related as they are to the compensation picture, are coming in for their share of scrutiny.

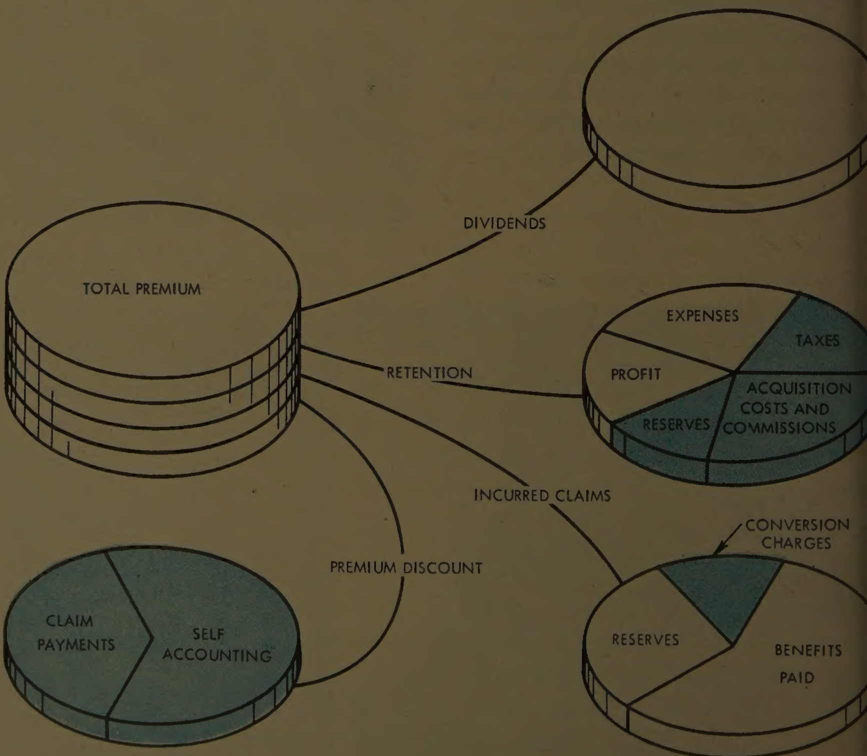
This article will consider a number of steps which can be taken now by utility benefit plan administrators to cut plan costs. The particular plans to which it will confine itself are group life and group medical expense insurance. The companies to which these remarks will be particularly pertinent are those of sufficient size to warrant the use of individual experience rating in the determination of their group insurance premiums.

### Group Life Insurance

There has been a tendency among many companies to pay scant attention to cost savings possibilities insofar as group life insurance is concerned on the theory that the main item of cost is, after all, the death claims and no mortal can control these. (See Fig. 1.) As regards the insurance company's charges or retentions, it is often believed these are largely standardized with little room for modification. Requests for detailed information on a carrier's retention may draw a sluggish response and little meaningful data; moreover, a number of employers hesitate to pry into the fiscal affairs of their insurance carrier, feeling that they would themselves regard as impertinent any such probing by their customers. This reticence is, of course, misplaced since group insurance operates on cost-plus principles with dividends or credits promised (though not guaranteed) after plan costs have been met. It would seem imperative, therefore, for a conscientious plan administrator to inform himself as precisely and as fully as possible regarding the disposition made of his company's insurance premiums.

Before delving into the obscurer areas of the insurance company
retention, mention should be ma
of two quite simple methods
which economies can be effected
the group life insurance program.
commonly overlooked area of co
reduction relates to the conversi
privilege under which a termina
ing employee may exchange h
group coverage for individual i
surance without proof of healt
The conversion privilege can pro
quite costly to the employer b
cause each time an employee elec
conversion, a charge is made again
the group experience at a rate
approximately $65 per $1,000 co
verted. Simple arithmetic disclos
that each $10,000 conversion incu
a charge of some $650. The er
ployer is usually unaware of th

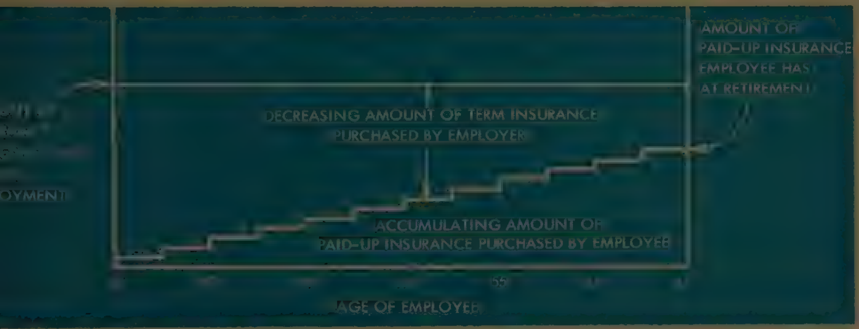
Fig. 1—Allocation of group insurance premiums. (Shaded areas indicate possible sources of savings.)



e he seldom knows what action rminating employee takes re- ling his group insurance and the ier in its year-end report, as a , lumps conversion charges to- er with death payments under heading "incurred claims." The on for the existence of a con- ion charge, of course, is to pro- the carrier against the assump- of poor health risks under the -medical provision of the con- ion option.

hile admittedly the ailing are e likely to use the privilege the healthy, nevertheless, y terminating employees are to pass an insurance company sical and, by so doing, gain per- l benefits. They should be told ut these benefits and the im- ant disability waiver of pre- m and double indemnity fea- s. It is surprising how few loyers take the trouble to sug- to their employees, either via plan booklet or at the exit inter- , that in converting their in- nce they consider making ap- ation for a regular individual y, subject to medical examina- , at the same time that they e application under the conver- privilege. By doing this em- ers could save themselves con- rable sums levied against their rience because of uninformed of the conversion privilege.

g. 2—Group paid-up insurance eliminates the cost of continuing group term life insurance ter an employee retires.



### Self Accounting

second method of reducing s is through use of self-account- or short-method administration draft book in the administration e group life insurance program. elieving the insurance company e necessity of keeping records preparing insurance certificates and riders, the utility can effect a saving in its insurance cost of approximately two percent of the annual premium. An additional allowance is available where the utility issues the claim drafts itself. For most employers this is a worthwhile saving in return for little effort. The insurer provides complete instructions as to these procedures and usually the process can be taken over by the firm's regular accounting system without creating a substantial additional burden.

Employers are today increasingly addressing themselves to the problem of providing life insurance for employees when they retire. This benefit is a costly one since it involves a definite commitment to pay a sum of money on behalf of every retiring employee at some undetermined future date. Here is one way to solve the problem of funding retirement benefits in an economical fashion. Premium cost projections for such plans, when financed entirely by term insurance, reveal a steep rise for a period of approximately 40 years at which time the ratio of retirees to all employees becomes stabilized and costs can be expected to level off. Company X, after studying the problem exhaustively, decided to scrap its conventional group term plan and substitute in its place a group paid-up life insurance program, also known as group permanent.

Under such a plan, employees purchase their own post-retirement life insurance by means of larger group contributions during their active years. (See Fig. 2.) Their contributions are devoted to the purchase of paid-up insurance whose cash value is never less than the amount of the contribution. Thus, if an employee leaves the company before retirement, he can, if he wishes, obtain a refund of 100 percent of his contributions. If he stays on until retirement, he can accumulate an amount of insurance sufficient to meet his basic death benefit needs, and on which no further premium payments will be required after 65. His company supplements the paid-up insurance with term coverage to reach the desired benefit level. While this represents a higher initial cost to the employer, premiums reduce over the years as paid-up credits accumulate, with the expectation that after approximately 25 years the employer's cost will be back to where it was before the changeover.

Let us now take another look at the insurance carrier's retention. This is an important area for savings consideration. It includes such items as administration and claims handling costs, agents' commissions, acquisition expenses, taxes, reserves and profit or additions to surplus. The total retention can represent a sizeable charge against premiums and should thus be regularly subjected to close, informed scrutiny. Some components of the retention are levies as to which there may be no room for negotiation. Others, however, represent charges determined to be appropriate to the particular case by the carrier's actuaries and accountants and it is in this area that valid differences of opinion can and should be aired so that any apparently excessive or unreasonable charges are fully justified, modified or removed entirely.

An example of how the unwary employer can pay unnecessary retention charges is typified by Company Y which prided itself on paying its insurance premiums annually in advance, receiving interest at three percent in the retention formula on the portion of premium not currently needed to pay for coverage. What Company Y did not realize was that with the imposition in 1959 of the burdensome Federal income tax on life insurance companies, hiking carriers' total tax bills by as much as 60 percent, each group policyholder was duly assessed its share of this cost, and Company Y's carrier, without direct notice to its group policyholder, was recouping its tax costs by reducing the interest allowance on premium reserves by 50 percent to an effective rate of 1½ percent.

Without the kind of searching inquiry advocated above, this item might not have come to light and the increased retention would probably have been ascribed merely to the general inflationary trend. As it turned out, this employer not only changed his premium payment method to the monthly basis (there were additional reasons justifying his doing this) but successfully negotiated with the carrier a release of sizeable claims reserves in return for certain undertakings in the event of contract termination. This assured profitable use by Company Y of its funds which were being held by the carrier and credited with negligible interest earnings.

## Medical Expense Insurance

Our attention to cost reduction in this field presupposes the utilization of insurance company underwritten, experience rated "indemnity" plans and not prepaid "service" type programs usually provided by nonprofit organizations. Obviously, the latter are not appropriate to our discussion since for the most part these plans are not individually experience rated. Nevertheless, in the light of the extensive use made of such plans, it seems appropriate to consider whether a contributing employer can expect to fare better under an indemnity or under a service type program.

It appears that the greater flexibility of the insurance company's indemnity plan provides superior financial protection to the employer in these inflationary times. (See Fig. 3.) As medical care costs rise, premium costs for the same protection must increase proportionally. If these increases are to be kept in check, a plan must be capable of adjustment to permit insureds to assume a larger share of the risk themselves—to insure only against those medical expenses which would actually represent a hardship to have to pay. By this test, plans promising paid-in-full service benefits cannot provide the type of solution needed. Through their commitment to furnish such all-embracing coverage, whether or not required, their rate structure has a built-in bias that must reflect the full effect of inflationary and other upward cost movements when, or soon after, these occur.

By contrast, this factor is not a necessary characteristic of indemnity type medical expense plans since the insurance companies' liability for benefit payments are ordinarily limited by contract to a fixed dollar amount per day in the hospital and to specified maxima for other charges, with the result that deficiencies in indemnities due to higher costs can be mitigated or stabilized through agreed contract adjustments. There seems to be justification, therefore, for the assertion that in times of rising health care costs, use of a service type program is a virtual commitment to keep paying higher subscription rates, whereas resort to indemnity coverage permits expansion or contraction of benefits between insured and carrier with resulting greater flexibility in the determination of how best to cope with the inflationary problem.

## Numerous Techniques

The employer with an indemnity type plan has numerous techniques available to him for cutting costs. As in the case of group life insurance, savings can be effected by use of self-accounting and by analyzing insurance company retentions and resisting the establishment of excessive or unnecessary reserves. Significant savings are also possible in this type of program by controlling claims expenses, including plan abuses. This is not an easy task and expert outside assistance is often needed to insure results. A careful reveiw of the claim payments over a representative period should be made to determine the nature and extent of the plan's utilization and its effectiveness in carrying out the objectives established for it. Specifically, answers should be sought to the following principal questions concerning plan operations:

1. What has been the incidence of different types of medical expense? How many cases of hospitalization were involved? What was the average length of stay?

2. How do the reimburseme percentages vary among differe employee groups, between emplo ees and dependents, in respect retired employees, and among bi of different amounts

3. What percentage of the er ployee's hospital, surgical, misce laneous expense and combine medical bills is being met by t plan? How do current ratios co pare with earlier percentages a what detectible influences are work tending to change the ratios?

4. What specific types of bene are consistently reimbursing clai ants too much or too little?

Responses to such questions c be readily compiled if the employ has taken the trouble to set up l record-keeping appropriately.

A proper system is one that organized in such fashion that wi each claim payment the admini trator records on specially design forms the pertinent claim da which will lend itself to easy tab lation and sorting to furnish t answers needed. In a study ma for Company Z, a Midwestern c ent, for whom such a control syste had been set up a few years ag it was comparatively easy to pr vide the pertinent facts to cope wi a recent employee demand for increase in hospital daily room a board rates from $10 to meet ave age daily semiprivate rates in t community of $16.

The over-all statistical analys that the average dollar of expens incurred by employees was bei reimbursed 81.5 percent, fro which it was obvious that othe excessively liberal benefits, must compensating for the considerab lower 62.5 percent hospital roo allowance rate. The areas of su liberality were quickly identifi and by a process of tightening u it was possible to raise the roo and board rate to a satisfacto level—all without increase in t plan's net cost or imposition undue financial hardship on e ployees. Had it not been for t existence of an appropriate da collection system which made possible to use specifically devis analytic techniques to reach t source of the trouble, Company would have been tempted to ta

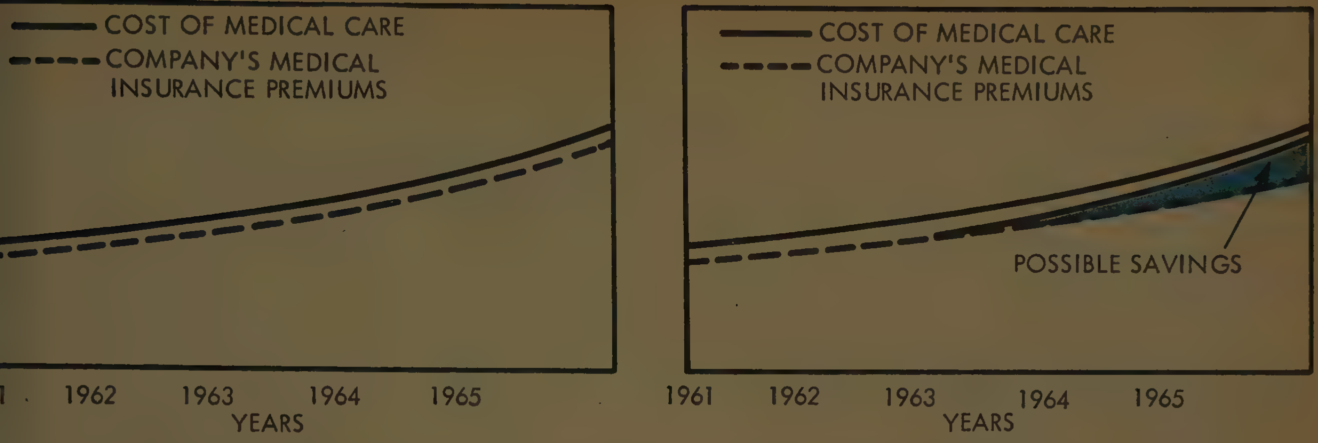


**Fig. 3—Left, influence of medical costs increase on premiums for a plan providing "service" benefits. Right, influence of medical costs increase on premiums for a plan.**

line of least resistance and sim- increase hospital benefits—at siderable extra premium cost. e Fig. 4.) In addition, the spe- areas of waste would have e undetected and would have tinued to add to their troubles.

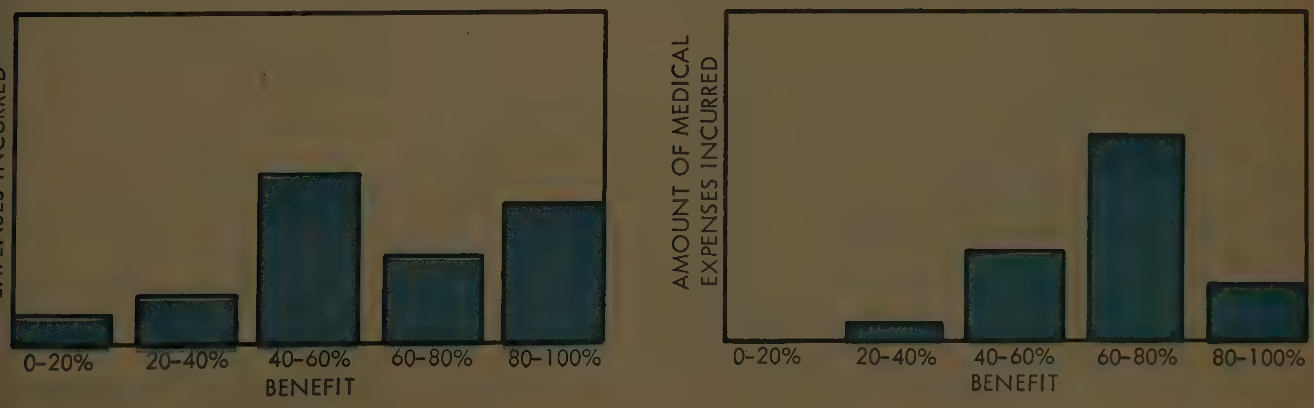
### Physicians' Expense

n concluding this discussion of lical care costs, mention should nade of a useful device by which s now possible to gauge the sonableness of claims involving sicians' expenses. A few years , the California Medical Associ- n made an extensive study of charged in the State of Cali- nia and issued a Relative Value dy setting forth standards on ch physicians might base their schedules. It was not the pur- e of the Study to set any fees, simply to establish a consistent tern of relationships among fees each of four distinct classifications: medical services, surgery, radiology and pathology. Armed with a copy of this Study, a plan administrator knowing, for example, that Dr. Jones' normal charge for an appendectomy is $200 can, by using the appropriate conversion factor (which helps to measure the relative degrees of skill required for some 2,000 different procedures), determine that his fee for, say, a Caesarean section should be approximately $285. The Study is intended merely as a guide and does not, of course, bind physicians in respect of their fees.

Comparable data has been compiled by various insurance companies with reference to other areas of the country and the administrator thus has access to a valuable means of determining the reasonableness of medical fees in his own or nearby areas. If he feels there has been an overcharge, he should not hesitate to communicate with the physician direct or to urge his insurance carrier to take action.

This discussion has sought to outline some of the available methods by which benefit plan costs may be controlled or reduced. Responsibility for initiating action to arrest the upward surge of plan costs lies primarily with the utility, not the insurance company. In the medium and smaller sized companies the plan administrator is often only a part-time practitioner in employee benefit plans and cannot give the subject the attention it deserves. Frequently, an impartial outside viewpoint can guide the part- or full-time administrator to a profitable solution of his problems. What is required most in the matter of controlling benefit costs is a clear understanding of the plan's objectives, the knowledge and imagination to determine how these can be successfully attained, and the willingness to take action once the appropriate course has been determined.

**Fig. 4—Left, a poorly-balanced plan's distribution of benefits and right, an improved plan's distribution of benefits.**



*Nine-year record of typical lightning arrest*
*operating data at a Georgia Power Compan*
*115-kv substation, correlated with the intern*
*condition of the arresters, has proved th*
*Magne-valve station type arresters provi*
*complete protection against all lightning an*
*switching transient overvoltages without an*
*measurable wear or loss of service lif*

# *Arrester Reliability* PROVED BY UTILITY FIELD TES

By T. J. ALLEN, Superintendent of Transmission, Operating Department, Georgia Power Company, and E. J. ALLEN, Manager Station Equipment Sales, Lightning Arrester and Cutout Product Section, General Electric Company

EFFICIENTLY DESIGNED arresters of the true valve-type do not "wear out" nor is there any measurable consumption of the active elements while performing within their intended service duty.

This statement has been reaffirmed by one of the first jointly sponsored field tests of Thyrite Magne-valve station-class arresters initiated between the Georgia Power Company and General Electric Company in 1951. Situated at an isokeraunic level of 50, Hartwell, located in northeast Georgia, is typical of many of the medium-sized substations on the system. The results given here not only constitute a progress report of intensive study of nine years of arrester operations, but yield interested subsidiary data at Hartwell Substation.

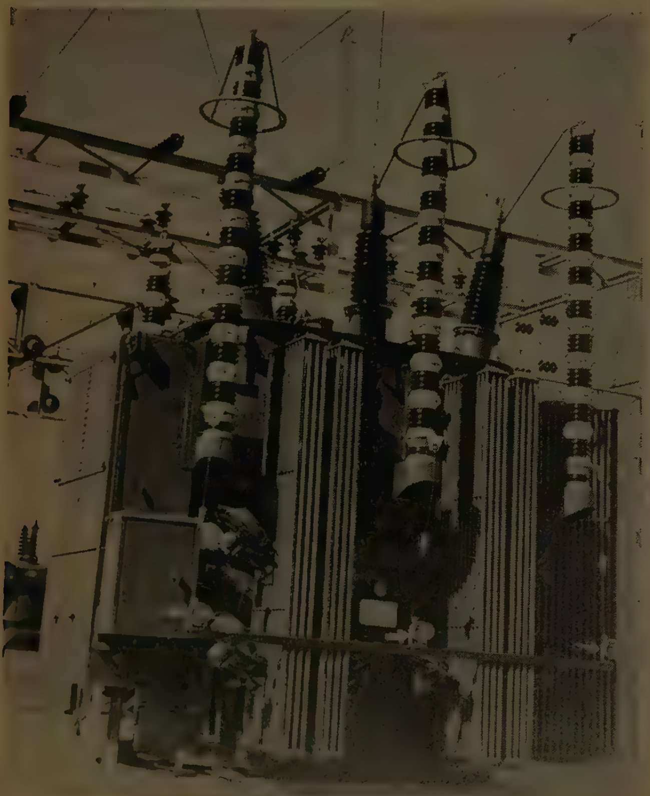


Fig. 1—Installation of surge crest ammeter links and lightning arrester discharge counters (shown by arrows) in each individual ground lead of 3 thyrite Magne-valve station arresters rated 40-kv (3¼ units) protecting 46-kv side of 20,000-kva power transformer at Hartwell Substation.

### Long Service Records

It is almost axiomatic that literally tens of thousands of efficient valve-type arresters have been in service for decades, even though dynamic obsolescence and economic
dictates have by now rightfully wa
ranted retirement of many of thes
For example, a true valve-type a
rester such as the Thyrite static
arrester first introduced in the ear
1930's has performed and is st
performing in large and mediu
substations throughout the wor
for periods up to thirty years.

Another noteworthy example
the still older pellet distributic
arrester first used in 1922, and th
first valve-type distribution arres
er. There are many thousands
pellet arresters of the earliest er
of manufacture of the 1920's st
in service. However, to the casu
observer who views an inanima
and sealed protective device, th
far-reaching importance of the ligh
ning arrester to the entire electr
system's successful operation ma
escape accurate comprehensio
That is why this subject is of co
tinuing interest and so vital to th
correct interpretation and unde
standing of real benefits of efficie
lightning arresters. As one of se
eral current field studies of arreste
discharges at stations, this joi
study gives heretofore unpublishe
data, in chronological form sin
installation in 1951.

### Purpose

The objectives of this joint stud
are:

1. To record the number of singl

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Editor's Note: This article was adapted from
paper presented by the authors at a rece
meeting of the Southeastern Electric Exchan

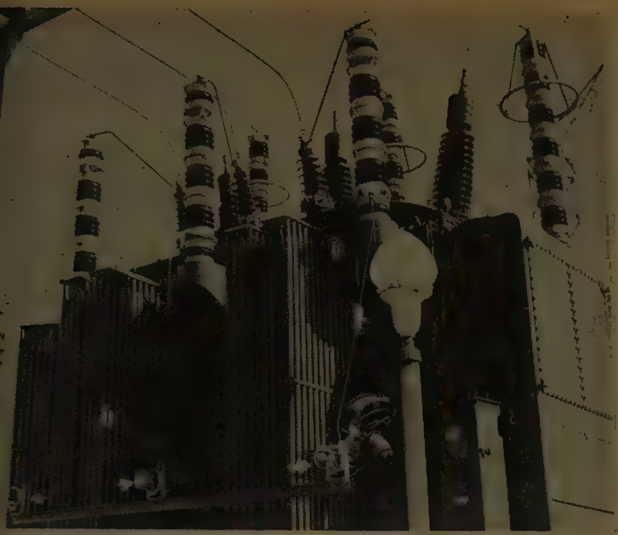


Fig. 2—Installation of surge crest ammeter links and lightning arrester discharge counters (shown by arrows) in each individual ground lead of 3 thyrite Magne-valve station arresters rated 121-kv (10 units) protecting 115-kv side of 20,000-kva power transformer at Hartwell Substation.

e arrester operations from light-
g, and/or switching surges.
. To simultaneously record the
ge current amplitudes dis-
rged by the arresters and corre-
these with objective (1).
. To periodically check the con-
on of the arresters using both
table field test equipment and
tine return of the original arrest-
units (furnished in 1951) to the
sfield (Massachusetts) Works
complete impulse and 60-cycle
s, plus thorough physical inspec-
. The latter test results were
npared directly with correspond-
characteristics of new arresters
imilar design.
ocated in lowland country near
Savannah River, Hartwell Sub-
tion is connected to both the 115-
and 46-kv systems of the Georgia
wer Co. The lightning arresters
died protect both the 115-kv and
kv sides of a 3-phase 20,000 kva,
-winding power transformer. As
wn in Figs. 1 and 2, three /3/
gne-valve station-class arresters
ed 40-kv and three /3/ Magne-
ve station-class arresters rated
-kv are mounted on the power
nsformer tank. Two overhead
und wires shield the substation
its immediate vicinity from
ect strokes. The 46-kv and 115-kv
s connecting to the substation
not equipped with ground wires.
station ground resistance is 2
ns or lower, despite a heavy de-
it of mica in this area.
nstrumentation to secure objec-
s (1) and (2) was provided with
h single-pole arrester and is still
ployed. To attain objective (1)
GE discharge counters are used
utomatically record arrester dis-

charges. The counters of the type shown in Figs. 1 and 2 have a sensitivity to record threshold currents of approximately 100 amp crest *or higher*. However, most repetitive discharges would record only one operation on the cyclometer dial of the counter; hence it is important to note that the counter would err on the low side of any totalizing of arrester discharges observed over a given period of time. This means that the duty on the arrester can be much greater than indicated by the current figures and counter operations due to the effects of multiple strokes and long duration current flow.

To attain objective (2), the surge crest ammeter method was employed. This device is quite well known and though possessing limitations in scope, it has admirably served the purpose here. The magnetic links were checked after each major storm activity and changed if found to be magnetized.

## Arrester Operations

The detailed number of operations and discharges of the station-class arresters protecting the 44-kv and 115-kv apparatus from September 1951 through November 1960 were recorded. This investigation is continuing and further data is being secured throughout 1961. During approximately nine years of service embraced by this operating data, the Phase 1, 40-kv arrester discharged 63 times; the Phase 2, 40-kv arrester discharged 95 times; and the Phase 3, 40-kv arrester discharged 62 times. This represents an average of 73 discharges per pole in nine years, or 8.1 discharges per pole per year.

Over the same period, the Phase 1, 121-kv arrester discharged 15 times; the Phase 2, 121-kv arrester

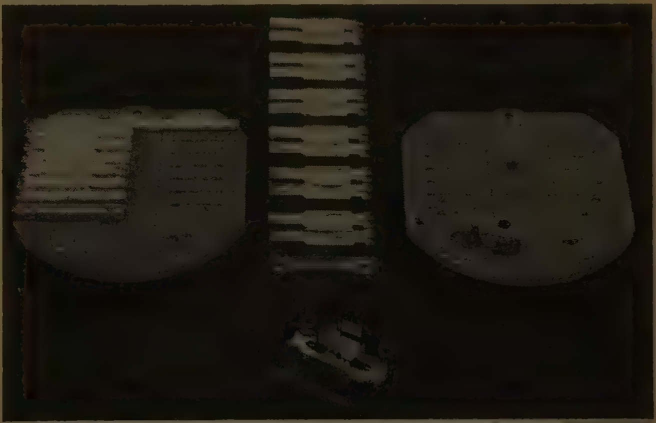


Fig. 3(a) — Disassembled gap unit and magnetic coil removed from top 12-kv arrester unit, Phase 2, 40-kv thyrite Magne-valve station arrester in October 1953, after approximately 23 operations recorded on discharge counter.

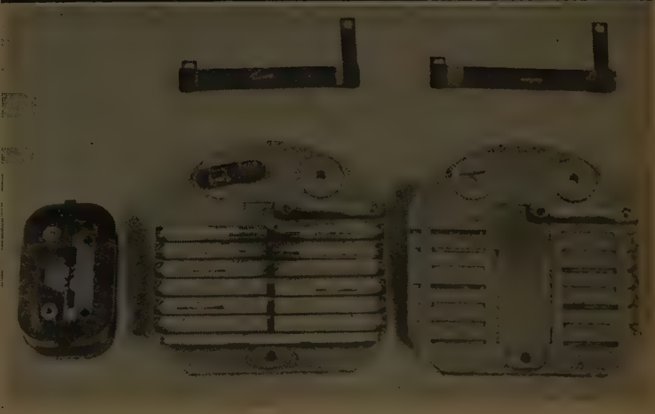


Fig. 3(b) — Disassembled gap unit and magnetic coil removed from next to the top 12-kv arrester unit, phase 2, 40-kv arrester on October 26, 1959 after 89 operations recorded on discharge counter.

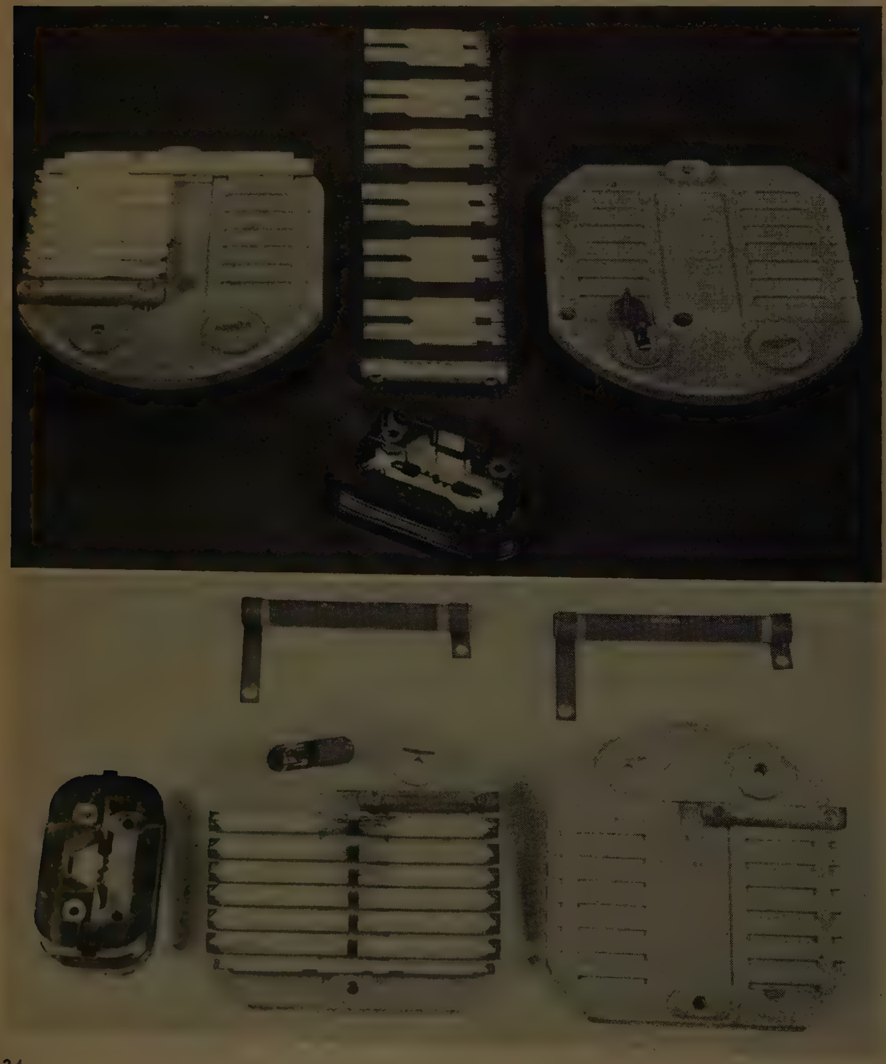
discharged 35 times and the Phase 3, 121-kv arrester discharged 40 times, for an average of 30 discharges per pole in nine years, or 3.3 discharges per pole per year.

The year to year pattern shows relatively few discharges from November or December to March of each year. No detailed record was kept of infrequent switching operations on these lines. From the trend of the data, coupled with the current amplitude measurements, there is good reason to believe that nearly all discharges recorded in this specific case are due to lightning. In other field investigations, quite the opposite relative preponderance of switching surges and lightning have been obtained.

One of the discharges recorded was 20,000 amp, which is the highest ever recorded from arresters at stations. Field experience derived showed that only a few months after the instrumentation was in place, the higher range discharge currents of 16,000 amp were recorded. This contradicts the erroneous contention that "years" would elapse before relatively high lightning currents would be discharged by arresters.

Data on direct lightning stroke currents show that approximately 4 percent of the stroke currents exceed 100,000 amp. Remembering that Hartwell Substation is shielded by two overhead ground wires, the conclusion is that this shielding was effective; otherwise discharge currents in excess of 20,000 amp might logically be measured through the lightning arresters. The lightning arresters of the type described at Hartwell have a discharge capacity of 150,000 amp (5 x 10 $\mu$s wave) and a long duration surge withstand c
pacity of 650 amp for repeated app
cations of the 2,000 $\mu$s rectangul
test wave. It is interesting to no
that the lightning protection reco
at the substation has been perfe
since installation in 1951.

Fig. 4(a)—Top, disassembled gap unit and magnetic coil removed from top arrester unit, phase 3, 121-kv thyrite Magne-valve station arrester in October 1953 after 9 operations recorded on discharge counter; and Fig. 4(b) below, disassembled gap unit and magnetic coil removed from next to the top arrester unit, phase 3, on October 26, 1959 after 37 operations.



## Detailed Examination of Arrester

In accordance with advance a
rangements, after three years
service, one 12-kv unit from the t
of each single-pole arrester (40-
and 121-kv) was returned to th
factory for disassembly in 195
Figures 3(a) and 4(a) show g
units returned from the arrest
phase legs which had the large
number of arrester operation
These photographs show the arres
er to be in perfect operating cond
tion. Metal internal parts of all uni
examined were clean and bright.

Again, after 8 years of servic
one 12-kv unit removed from t
next-to-the-top of each single-po
arrester (40-kv and 121-kv) was d
assembled and examined. Figur
3(b) and 4(b) show units return
from the phase legs which had t
greatest number of operations; v
89 operations on Phase 2 of the 4
kv circuit, and 37 operations
Phase 3 of the 115-kv circuit. T
scars on the arrester gap electrod
are moderate, but corroborate t
numerous operations which we
recorded by separate instrument
tion. The appearance of the d
charge marks on magnetic gap ele
trodes is in complete accord w
that expected from the Magne-val
operating principle. Before retu
to the factory, the units passed fie
tests using the Doble Type MH po
able insulation test set.

Laboratory equipment regular
used for production line testi
showed all Hartwell arrester uni
(manufactured in 1951) retested
November 1959 to have electric
characteristics well within the pu
lished guaranteed maximum valu
for new 12-kv arrester units for:

(a) ASA front-of-wave spar
over—100 kv/$\mu$s rate of rise

(b) Discharge (IR) voltage
1500 amp. In addition all six
turned units passed tests applica
for new units on:

(c) 60-cycle grading current

(d) 60-cycle sparkover voltage

(e) Radio influence volta
(RIV).

# D Group Studies New Developments OH and UG, Safety, Standards, Training

Officially welcoming Edison Elec- Institute's Transmission and tribution Committee and guests Des Moines last month, A. P. ompson, president of the host va Power and Light Company, ninded conferees that man's po- tial is hardly tapped; that many llenges exist urging him to un- take greater things. Along with achievements, he said, costs tter too; T&D represents one- f of our investment in plant and s essential that we operate eco- mically. The law of supply and nand is still in effect, he con- ded; if we keep costs in line we l have no problem meeting sub- ized competition.

Lead-off speaker of the general gineering session, J. R. Kirkup, nsumer's Power Company, essed, the importance of first- e supervisors in administration the Working Agreement. While ey should not be expected to be perts on it, he said, they should ve a good knowledge of the pro- ions on which they can make on- -spot decisions. In this level of nagement, he suggested, there is eagerness for learning and for cognition, and the potential of rich return on training dollars invested.

The role of the technically-trained man in the electric-utility industry is a broad one, according to F. J. Funari, West Penn Power Company, for this training and background is valuable not only in engineering pursuits but also in sales, purchasing, personnel work, legal (especially claims), rate making, and many other facets of the business. There is especially opportunity for engineers in management, he said, but they must have the breadth of vision to see the whole picture and the sensitivity and skill to properly weigh human values.

W. J. McLain, The Dayton Power and Light Company, reported corrective measures taken after some compression-splice failures on heavily loaded lines. These included making sure splicers know how to make good splices, use of high-melting-point sealing compound, cleanliness of all components, and periodic checks with an infra-red pyrometer.

A structural analysis of a typical H-Frame, presented by J. B. Sullivan, Iowa Power and Light Company, separated horizontal and vertical components of forces acting on the structure. After analyzing separately the forces developed for each condition, these were added algebraically to find actual forces in structural members.

G. Hally, left, representing the host Iowa Power and Light Company, discusses the EEI-T&D gram with Committee Chairman T. C. Duncan, Con Edison, and Dean of Engineering G. R. Town, a State University.

H. G. Saddock, Rochester Gas and Electric Corporation, described development of a 115-kv single-circuit line for an extremely limited right-of-way. Feature of the line is the use of horizontal side post insulators mounted directly on poles. Result was practical and attractive, with inherent advantage of self washing and draining insulators.

### Overhead Session

Discussing the role of shunt capacitors on a utility system, J. E. Conner, Southern California Edison Company, concluded that they provided an economic and reliable source of reactive power. Switching of large banks has presented some problems, he said, but availability of restrike-free switching equipment, in the form of capacitor oil switches plus power fuses for primary protection, and vacuum switches seem to have solved the problems. Acceptance of the latter, he said, will depend on the outcome of tests and economic evaluation.

Discussing theory and design of capacitor switching apparatus, H. T. Zamzow, Line Material Industries, told conferees that capacitive current switching has its own peculiar voltage and current behaviors. Successfully and economically performing such switching, he said, depends on selection of equipment with characteristics to meet these peculiarities.

Appearance of overhead facilities is the job of each individual and each department whether the activity is planning, designing or building, H. H. Brooksieker, The Cleveland Electric Illuminating Company, told delegates. CEI has accomplished better appearance because of this approach, he said, while reducing cost, improving safety, and increasing reliability; but, there is much to be done and maximum results can only evolve from identifying the problems and working with suppliers to find answers.

Trend in engineering education

at Iowa State University, and several other leading engineering schools, according to G. R. Town, ISU dean of engineering, is toward bifurcation: the research scientist with lots of math and science training, and the more general education giving a technical background tempered with economics, psychology, business administration, law etc. Business needs both types, he said, and everyone doesn't want to be a research scientist.

### Standards

Standardization is accomplished at Long Island Lighting Company, according to I. M. Miller, by central control, mutual acceptance, and by improvement and revision. In addition to thousands of manhours spent in actual development, production and distribution of standards, he said, the company exerts influence directly on manufacturers, through representatives on EEI, AIEE, ASME, and AGA, and by commenting or voting on proposed standards. Through these various programs, affecting design, purchasing, construction, and operation, better service has been provided at lower cost. But, even with the considerable progress made, he concluded, our T&D department had to stock and handle 8000 items last year; standardization is still a fruitful area for further efforts.

A discussion of aerial basket safety by B. J. Lorenz, Northern Indiana Public Service Company, will be presented in full in a future issue of EL&P.

### Underground Session

Reporting on some two-million feet of aluminum underground cable on the Philadelphia Electric Company system, H. L. Davis, Jr., said that all failures have been on low-voltage circuits and caused by moisture attacking the conductor, pointing up the absolute necessity of having insulation and jackets completely impervious to moisture, and with ends sealed. Economic advantages of aluminum conductors can be available in underground service, he said, if it is recognized that this cable must be manufactured, installed, handled and operated with an entirely different philosophy than its copper equivalent.

The oxide coating of aluminum conductors must be preserved to prevent severe localized eruptive corrosion of insulated conductors, L. L. Carter, Anaconda Wire & Cable Company, told conferees. Difficulty of developing materials that will adequately fill and seal strand without inconvenience in splicing and terminating is appreciated by all, he said. Full utilization of insulated aluminum for underground installation will be hastened, he suggested, if pilot installations with periodic inspections are made whenever extensive laboratory work has developed an apparent solution.

Cause of failure in insulated aluminum conductors is normally due to improper installation and not the metal involved, according to W. K. Priestly and H. S. Spaulding, Kaiser Aluminum and Chemical Corp. Of the millions of feet in service, they reported, the service record is excellent. Insulation, splicing and connector problems have been solved, they said, and development work is well along on a conductor containing a chemical corrosion inhibitor which makes any water that may enter the conductor non-corrosive.

Philosophy of the Iowa Power and Light Company with respect to residential underground service, according to H. G. Hally, is that the home owner ultimately pays both builder and utility costs, that the traditional point of delivery is at the residence itself, and that service maintenance that far is the utility's responsibility. On this basis cost of 7620-volt service to a utility-owned utilization transformer at the residence was compared to overhead service cost to arrive at a figure $300 below previous estimates. Cost is competitive with conventional underground to high-use developments, said Hally, and advantages of simplicity, flexibility and permanence are gained.

Joint installation of underground direct-buried power and communication facilities with random separation in a single trench, was described by M. F. Tuntland, Commonwealth Edison Company. Considerable savings are possible, he said, by having one minimum-size crew lay all cable for both companies in this manner on an agreed-billing basis. Additional savings would be possible, he suggested, if ownership and installation of service cable were the responsibility of the power company, making is possible to use a joint pedestal, a combination service cable, and do service work on a joint basis.

**Parker R. Lawson, seated left, newly elected president of Pennsylvania Electric Association, poses with G. Raymond Parry, retiring president of P.E.A., and other officers at the close of the 54th annual convention at Philadelphia. Officers of the association are, seated left to right, Lawson, comptroller of Pennsylvania Electric Company; Parry, Metropolitan Edison Company executive vice president, and, standing left to right, Franklin H. Lichtenwalter, vice president and managing director, P.E.A.; R. W. Hurd, West Penn Power Company; Philip M. Alden, Philadelphia Electric Company; and Charles S. Bowden, Pennsylvania Power Company.**

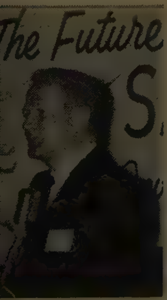
# ELPA Business Development Conference
# tresses Demand for More Salesmanship

Salesmanship and all it can pro-
ce for electric power companies
ntinues to rate top attention to-
y out in the Pacific Northwest—
ere average annual kilowatt-hour
nsumption per customer more
an doubles that of the national
erage.

Regional sharing of selling knowl-
ge and techniques is nowhere
re effective than in the North-
st . . . and the principal clearing
use is the Business Development
ction of the Northwest Electric
ght and Power Association. When
s group conducted its 36th an-
al conference recently in Spo-
ne, Washington, discussions of
es and promotion efforts of the
LPA member companies all
rted from a logical conclusion,
pressed in the conference theme:
he Future Demands Salesman-
p."

Perhaps top-management endorse-
nt of the importance of efforts in
ling for the power companies is
st succinctly represented in this
ssibly somewhat exaggerated re-
rk in the welcoming comments
Pres. George Brunzell, of the host
mpany, Washington Water Power
.: "Soon after becoming president
WWP, I found that a five percent
rease in revenue equaled a 50-
rcent decrease in payroll . . . and
as converted to salesmanship."

Investor-owned utilities in the
rthwest, usually a few steps
ead of the industry in sales goals
d ways to meet them, report wide
d consistent use or adaptation of
national campaigns and programs. Medallion Home promotions are the backbone of marketing efforts, and electric heat installations are being multiplied rapidly in the Northwest. (Ex-
ple: WWP in mid-October had
out 250 electric heat customers
aiting to be hooked up.")



eorge Brunzell

The wide range of loadbuilding
erests, reported in numerous concurrent sessions of the NELPA conference, included a few newer fields—like water heating for swimming pools . . . and even an informal proposal to study the possibilities for offering utility customers an electric furnace package on a lease arrangement. Yet, there was no diminishing of interest in bread-and-butter outlets—example: one utility company is stepping up its efforts to exploit a revenue potential of $20 per meter per year in residential lighting, disclosed in a recent survey.

But, the one area which is attracting wider interest, perhaps, than all others now is residential underground—as a marketing measure and as a public relations problem. The Business Development Sections recently formed Underground Committee prepared a conference presentation, based on experience at Portland General Electric Co. and Puget Sound P. & L. Co.

### Underground: Fine Sales Tool

Puget's Vice-President R. F. Plymire declared that underground service is a fine sales tool for the developer irrespective of the type of electric service the utility company is asked to provide . . . and a powerful sales tool for both the utility company and the developer when "total-electric" contractural relations can be consummated. He noted that, as recently as two years ago, his discussion of underground service would have been "negative," since until recently, "Puget has viewed the construction of residential underground systems with a feeling of apprehension." Even today, he pointed out, under Puget's normal policy, the developer ends up with the entire underground investment covering the secondary system installation and excluding only equivalent primary overhead costs.

But, according to Mr. Plymire, Puget's present philosophy regarding "underground service as a sales tool" unfolded after two separate studies conducted independently enabled (1) the Engineering Dept. to conclude that the use of direct burial cable and pad-mounted transformers was feasible at a substantial saving in construction cost; and (2) the Sales Dept. to recognize that the Gold Medallion customer had a loadbuilding potential equivalent revenue-wise to three customers with electric range and water heater only.

**Last-minute conference details of NELPA meeting in Spokane are checked by WWP's H. U. "Bud" Wright, chairman of arrangements, and Utah P. & L. Co.'s Darcie H. White, chairman of the business development section.**

Mr. Plymire illustrated the progress being made under the utility's new policy with examples of residential projects being handled by several substantial building developers, including the Somerset subdivision of 200 Medallion homes initially and 3500 ultimately.

Even farther advanced at this time in this field is Portland General Electric Co., reported by Leo Chaffin to have in service more than 3000 living units on underground distribution. PGE's asst. sales manager stressed the Portland utility's position in offering underground service as one of recognizing the need to present "a proper corporate image."

Mr. Chaffin acknowledged that his company had encountered many problems, some of them very difficult, but had found none insurmountable. He noted that the key consideration is the investment ratio—PGE wants the same for underground as in the case of overhead. Under PGE's plan, the property owner must provide the raceway and the difference in the cost between underground and overhead facilities. Also, he said, PGE has a policy of avoiding investment in primary for less than a tract-size residential project.

The NELPA Underground Committee, headed by Graybar's Robert Button, is presently taking steps to prepare recommendations for a "package deal" for underground service tied to the All-Electric Concept, defining the parts to be played by contractors, utilities, project developers and residence owners.

### Heat From Lighting

In a discussion of "Electric Space Conditioning," GE's W. S. Fisher suggested that there are interesting possibilities for balancing the heating-air conditioning load by utilizing heat from lighting sources.

Robert Wilkinson, manager of the Inland Empire chapter of NECA, noted that the biggest market potential susceptible to exploitation by the contractors is the modernization field. He proposed that the need is not for more sales promotion, but to take better advantage of what is already being done.

A representative of the personnel division of Hotpoint, A. Claude Tindle, presented a proposition for establishing an institution of higher learning for professional salesmen—an American College of Certified Professional Salesmen similar to the American College of Certified Life Underwriters.

### Hear PR Advice

The NELPA Public Relations and Advertising Committee met jointly with the Business Development Section, and several other speakers on the NELPA program dealt with aspects of the industry's problems in government and public relations.

Milton Kapp, president of Interstate Power and chairman of the PIP committee, warned of the dangers of government takeover, as well as of loss of faith on the part of investors, unless a better public relations job is done by the investor-owned utilities. He suggested that, if the utility companies do things they should do day-to-day, they will avoid the crisis.

Reviewing "The B. C. Electric Take-over," that utility's former general sales manager, Otto Swanzig, saw little hope for any return of the Canadian property from the provincial government to private interests. He reported a great deal of current resentment on the part of the press in B. C. concerning the abrupt action, "now after it is too late." He advised other utility people to enlist the understanding of their local communications media in expressing the private power company position.

Southern California Edison's public information manager, Henry G. Harper, shared with the NELPA audience some of his company's experiences "on the school front." He expressed deep concern that "the battle for the minds of our youth is being lost by our industry to the government set."

Mr. Harper reported that the California utility is utilizing on a year-to-year continuous basis the "Power in Our Lives" program prepared by Paul S. Amidon & Associates. It was adopted in 1959 as "a school program to help balance the scale, after satisfying ourselves that an object story of electric power was not being told in contemporary school curricular, that students as a result were susceptible to the facts of our industry's accomplishments, that teachers welcomed supplementa materials, and that exposure to adequate materials changed adverse opinions."

After an initial coverage of the utility's service area schools by Amidon field people, Edison Field forces were brought into the picture to expand service to the schools According to Mr. Harper, this plan is now providing "the day-to-day contact that only our own local Edison people could effect as a necessary follow-through.

"They, together with our local Amidon field representative, are continuing to touch the bases which were unavoidably missed on the first and second rounds of distribution. From this point on, we view this as a continuous, year-to-year program, the extent of which will be limited only by manpower and budget considerations.

"The final measure of any program, of course, revolves around results. For if any material designed for the school audience stubs its toe at the school gates, no matter what the reason, then we might as well have saved our time and money Since our own program had not gained sufficient momentum for an accurate survey, we asked for ex-

NELPA business development section leaders sit on either side of luncheon speaker, Milton Kapp, chairman of PIP Committee and president of Interstate Power Co. At left is WWP's R. F. Plymire, a NELPA vice-president; at right is Darcie H. White of Utah P. & L. Co., retiring chairman of the business development section. The need to do a more effective PR day-to-day was suggested by Mr. Kapp.

New leaders of NELPA groups for coming year include (l to r.): W. W. Talbott of Montana Power Co., vice-chairman of business development section; Leo Chaffin of PGE Co., chairman of business development section; J. W. Heidt of Montana Power Co., chairman of rate research committee; NELPA's A. F. Krieg; and Jim Goggin of PGE, chairman of PR and advertising committee.

mples of results from other parts f the country.

"In our survey, we asked those 64,000 questions: 'How do you rate hese materials?' Eighty five percent aid excellent or very good. Thireen percent said average. Two perent said poor. 'Do you use the ourcebook in your teaching?' Niney two percent said some to much. Eight percent indicated only little ise. 'How do you like the charts?' Seventy three percent said appealng. Twenty six percent said averge. One percent said poor."

He reported that "Power in Our Lives" materials fit best in these subject areas: science, electricity, American growth and development, ndustry, power, inventors, and ommunity helpers. Some 88-perent of the teachers said these materials encourage further study about electricity and its impact on modern iving . . . and nearly 90-percent said hat the "Power in Our Lives" program helps to dramatize the basic actors of our American economic systems.

### Conclusion

Concludes Mr. Harper: "This response is the payoff of any supplenental program which fills an eduational void. No one can predict which electric company will pay the penalty for students who, as a reult of their exposure to government power propaganda today, beome dedicated government power voters tomorrow."

Retiring chairman of the NELPA Business Development Section, Darie H. White of the Utah P. & L. Co., outlined a new look in NELPA, the objective of which is to "get more new people involved in committee activities." He described the Section structure for 12 committees reporting through bureaus and the Section vice-chairman. He emphasized that a fall date has been established for the Section's annual conference, coinciding more effectively with sales planning schedules of the participating utility companies.

**Puget Sound Power and Light Co. has found that underground service can be a potent sales tool when associated with the "total-electric" concept applied exclusively to a tract of new homes. This home, with a commanding view of Lake Washington and the Olympic Mountains, is one of an ultimate 3,500 located southeast of Bellevue, Wash., in a "total-electric" community known as Somerset. The feasibility of the plans hinged on the practicality of underground service to be supplied by the utility. Puget concluded that the use of direct burial cable and pad-mounted transformers was feasible at a substantial saving in construction cost. To date Somerset has contracted for underground service to serve a total of 200 Gold Medallion homes.**

**wo honorary life members receiving presentaion at Spokane meeting of NELPA business levelopment section were Carl Hoffman, and lenry Vincent. Both are recent retirees, and are rom Spokane.**

## Micro-Film Information-Finding Service Announced By Haywood Publishing Co.

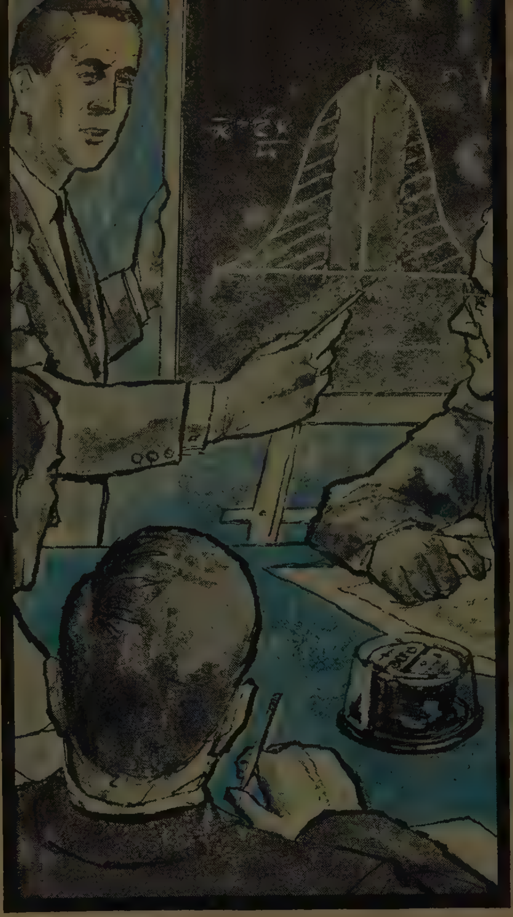
A new microfilm information-finding system that can cut valuable look-up time to a fraction of that required with conventional file and retrieval systems in being introduced to the electric utility industry as a new service of the Haywood Publishing Co., publishers of ELECTRIC LIGHT AND POWER and other trade magazines.

The new system, which will be leased to electric power companies and perpetually updated and maintained as a part of the service, can reduce as many as 60,000 pages of

*(Continued on page 67)*

**Tray shown in picture will hold as many as 75,000 pages of engineering and product information in the form of micro-film reels.**

**JET STREAM SERVICE** is a unique, automatic warehousing system that assures you of immediate delivery on standard high-volume meters, sockets, instrument transformers. ▼

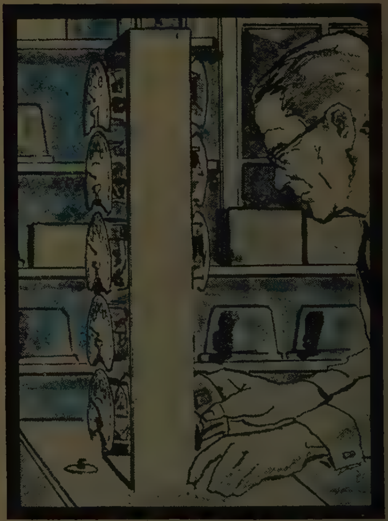


◀ **STATISTICAL SAMPLE TESTING SEMINARS** provide utilities with an idea-center for discussion of statistical techniques.

▲ **LOCAL PERSONALIZED SALES-SERVICE** provides experienced metering personnel, specialized services, extensive facilities on a day-to-day basis.

▲ **CERTIFIED QUALITY** program assures meter accuracy and reliability—average accuracy within 0.1% of reference kilowatt hour, 99.9% free of defects.

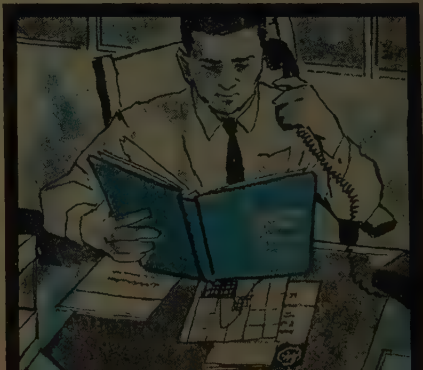
▲ **APPLICATION ASSISTANCE** helps in the correct selection of equipment, solving of metering problems.



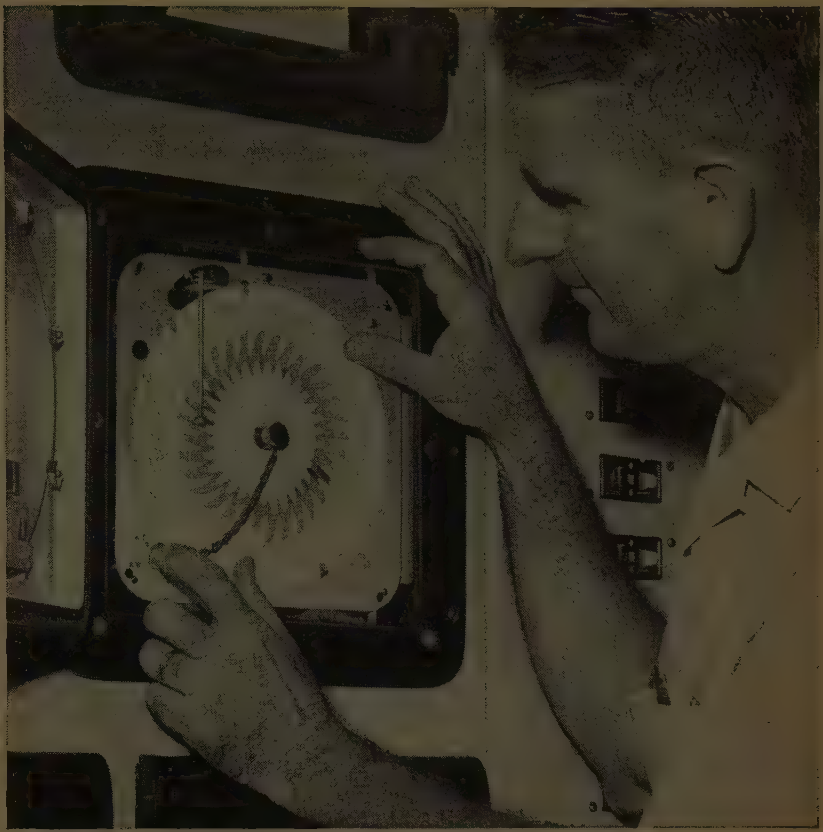
▲ **PRODUCT SERVICE** aims at full customer satisfaction in any problem area; supplies technical data and assistance.

◀ **METER COURSES** teach basic information—and new advances—on single- and polyphase meters, help utilities cut training costs.

**INDUSTRY COMMUNICATION**—G. E. disseminates metering information of all kinds—technical, informative, statistical—to keep utilities abreast of new developments. ▶



## Planned System Measurement in Action at LP&L



. . . The system measurement program developed by Louisiana Power and Light Company is an excellent example of how *planned system measurement* can improve system reliability with a minimum investment in equipment and engineering time. The company's standards call for Sangamo CCW/CCVAR Lincoln Graphic Meters at each substation to give readings of KW and KVAR loading. The use of these meters provides distribution engineers with information for placement and switching of power capacitors and, in addition, substation engineers obtain continuous records of KW and KVAR loading on power transformers. Both power factor and kva at any time can be easily calculated from the one chart without reference to other station meter readings.

The new CCW/CCVAR meter averages the KW load for 30 minutes, then averages the KVAR load for 30 minutes, to automatically produce a reading of each load once every hour (note chart). A switch arrangement permits the meters to measure only KW or KVAR when desired. CCW/CCVAR meters are available with chart speeds of 8, 16, or 32 days.

# How Louisiana Power & Light Company improves substation performance and virtually eliminates voltage complaints

THE SANGAMO TYPE V4S THERMAL INDICATING VOLTMETER provides the most economical means of obtaining minimum and maximum voltage values. Indicating pointers readily show if voltage levels are being maintained within acceptable limits . . . the readings provide the engineer with measured facts he needs to correct phase balance, regulation, and other system operating conditions.

Complaints about voltage on the LP&L system have been virtually eliminated through a major program which included substation regulation and the installation of hundreds of voltage regulators two or three miles beyond substations to maintain adequate voltage levels in service areas located past the load center.

The utility has adapted pole-top regulators to make it possible for meter readers to inspect and report monthly on the regulators' operation. Sangamo Type V4S Lincoln Voltmeters were installed with each regulator to continuously monitor the voltage operating range. The indicated voltage values are read and recorded on meter readers' regular rounds and the minimum and maximum pointers are re-set in preparation for the next monitoring period. The data gathered is then sent to the engineering department for study.

**SANGAMO ELECTRIC COMPANY** *SPRINGFIELD, ILLINOIS*

PS61-1

Dilemma in the Northwest

## BPA Seeks More Sales To Cut Payout Deficit

*"Our problem is not so much one of rates as it is of sales . . ."*

Such a management philosophy represents the best thinking of the investor-owned electric utility industry; but, in this instance it is the expression of a government power man — Bonneville Power's Administrator Charles Luce.

The dilemma his power system faces was summed up this way for the recent initial conference of BPA's regional advisory council, whose members total 125 representatives from business and political connections throughout Bonneville's far-flung service area in the Northwest. The BPA dilemma is not only not new, it is also well known in the area and probably over most of the power industry; but, Mr. Luce's review of it and his proposals for dealing with it is of significance not only to BPA but to the entire region, of course.

BPA readily concedes that it clearly faces the problem of finding markets for its power capability, particularly the secondary power and peaking capability. Thus, a self-evident conclusion is that the only alternative is a substantial increase in the Administration's wholesale power rates—if the Federal power system is not going to continue to operate at a deficit. The deficit operation in recent years (and "a very discouraging financial outlook for the future") cannot continue, "obviously," BPA officials admit.

Mr. Luce told his Council advisors that the problem is complicated by the fact that (1) BPA cannot make commitments of firm power to industry and (2) BPA has large quantities of secondary surplus power that is being wasted. And, prominent in BPA's financial dilemma is the fact that the power system's payout surplus has "melted" to under $38-million — less than half of what it was ($78.8-million) as of June 30, 1957, Mr. Luce pointed out.

A BPA financial status report distributed to the Advisory Council explains this in more detail:

"The deficit in F. Y. 1961 alone was $15.3-million and the forecast for 1962, the current fiscal year, is for an additional deficit of $14.4-million. At this rate the cumulative surplus will soon be wiped out and the reports will show a deficit instead of a surplus.

"The schedule shows for BPA alone a surplus of $27.1-million in 4 years from the payout surplus of $53.5-million reported as of June 30, 1957. For FPA considered alone, for fiscal year 1961 the deficit was $9.5 million and the forecast for fiscal year 1962 is $13.6-million.

"The fact that both the Corps of Engineers generating projects and BPA have recently been running in the red simply reflects the fact that BPA has not been able to allocate enough revenues to these generating projects in recent years (and will not be able to do so in F. Y. 1962) to cover their expenses for operation, maintenance and interest, plus the full scheduled amount for amortization of the capital investment. These generating projects, like BPA, had accumulated surpluses in prior years and, accordingly, they have been sharing with BPA in recent years the inadequacy of gross revenues to meet current annual system payout requirements in full.

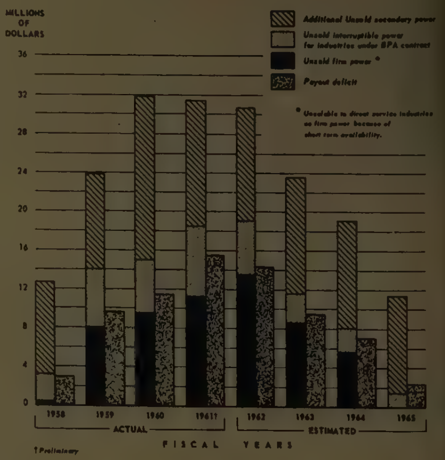
"Obviously, the Federal power system cannot continue to operate at a deficit. The system has had sufficient power capability to have continued to operate in the black these past four years had there been a market for the power that has been unsold. In fact, the total of unsold power has been quite substantially more than the deficits. In 1961, for example, the total amount of unsold power was approximately $32-million, versus a system deficit of not quite one half that much. While it is not expected that 100-percent of available power can be sold, there is considerable room for improvement over the current situation."

Naturally, BPA officials can be expected to resort to a rate increase only as a last resort, if ever. As Mr. Luce puts it, "A rate increase for industry customers might price BPA out of the market."

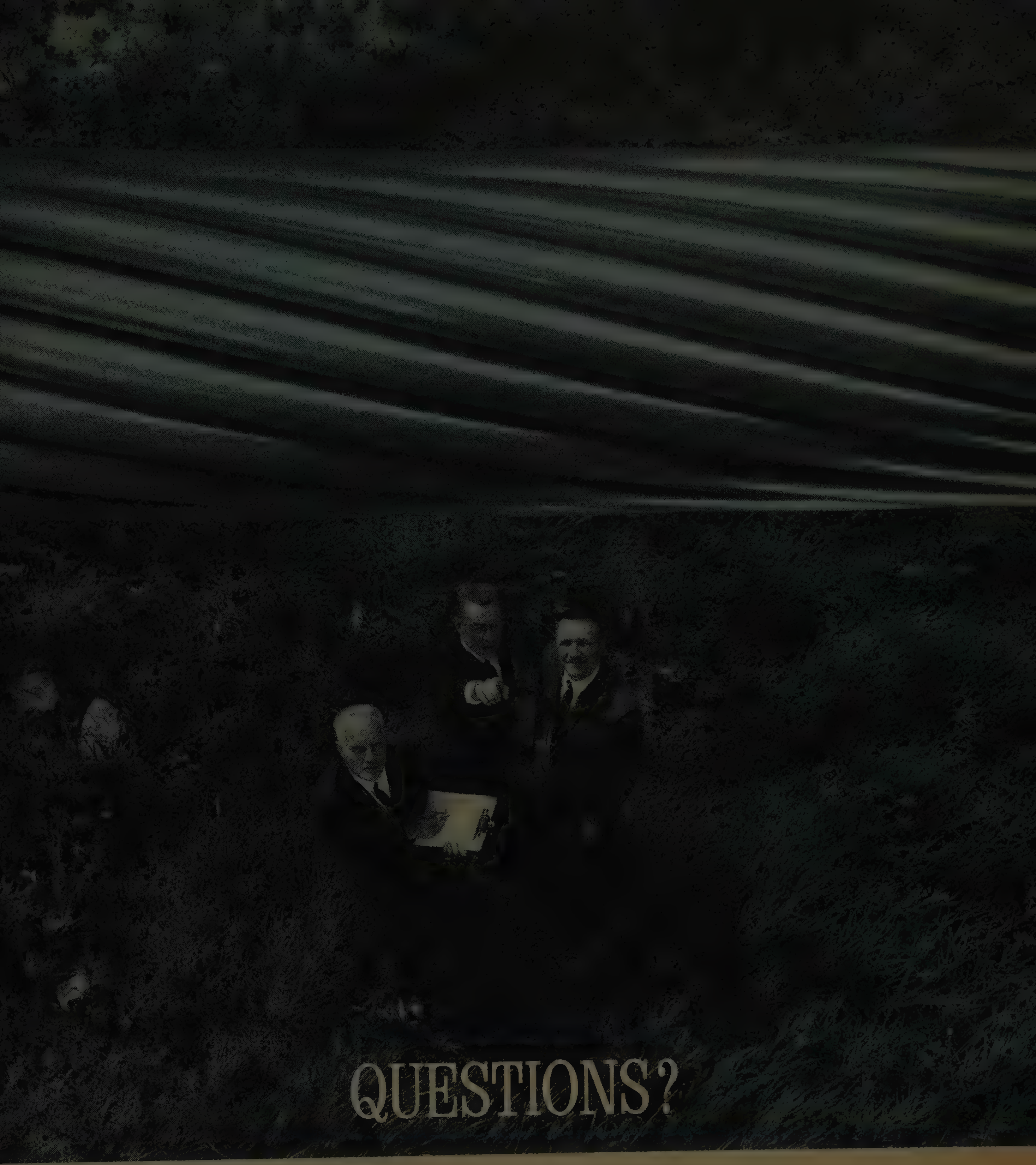
But, the problem is not getting easier. BPA's surplus has been growing and disposal to industry has been getting more difficult. Administrator Luce indicated that there are several solutions: (1) more power from Canada that would permit BPA to market more firm power, (2) the long-discussed intertie with California, and (3) power from the AEC's Hanford facility. (Editors Note: In his recent remarks for the NELPA annual meeting, Portland General Electric's Pres. Frank M. Warren mentioned the first two as "unsolved problems," did not refer to the possibility of utilizing Hanford power . . . and investor-owned utility leaders in the Northwest see little prospect of this being accomplished.)

Significantly, BPA's Luce is firmly aligned with others in the Northwest who are insisting that protective legislation must guarantee a re-

*(Continued on page 67)*



**How amount of unsold BPA secondary power has grown is shown in top portion of bar at left. Light portion is unsold interruptible power for industries under BPA contract, black portion is unsold firm power (unsalable due to short term availability). Right bar shows payout deficit, estimated for reduction beginning in '62.**



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If you'd like to know more about the many subjects on which we can provide answers, write to Rome Cable Division of Alcoa, Dept. 2-121, Rome, New York.

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DIVISION

# NUCLEAR NEWS

KEY ROLE OF SITE SELECTION in nuclear power project planning is getting more and more emphasis. (Conferees left the annual meeting of the Atomic Industrial Forum last month with many new reminders of the significance of this consideration, as reported in one full session devoted to this subject.) Current siting plans include: *Pacific Gas & Elect. Co.* bid to the state utilities commission for an ok to build the No. 1 unit of its proposed Bodega Bay Station on a 225-acre tract at the south end of a narrow harbor that separates Bodega Harbor from the Pacific Ocean, 50 miles north of San Francisco; *So. California Edison's* bid to put the proposed 375-mw plant on the Camp Pendleton Marine base; and *Niagara Mohawk's* revelation that it has acquired a site (which "presumably would be suitable for either a conventional or a nuclear station") at Scriba, N. Y., near Oswega on Lake Ontario.

"NO ONE SHOULD BE MISLED as to the true state of the art . . . (and) it would be foolish to assume that atomic power is now an off-the-shelf item," says Charles H. Weaver of Westinghouse, who recently reiterated his belief that "there is no substitute for developing and building large electric utility power plants."

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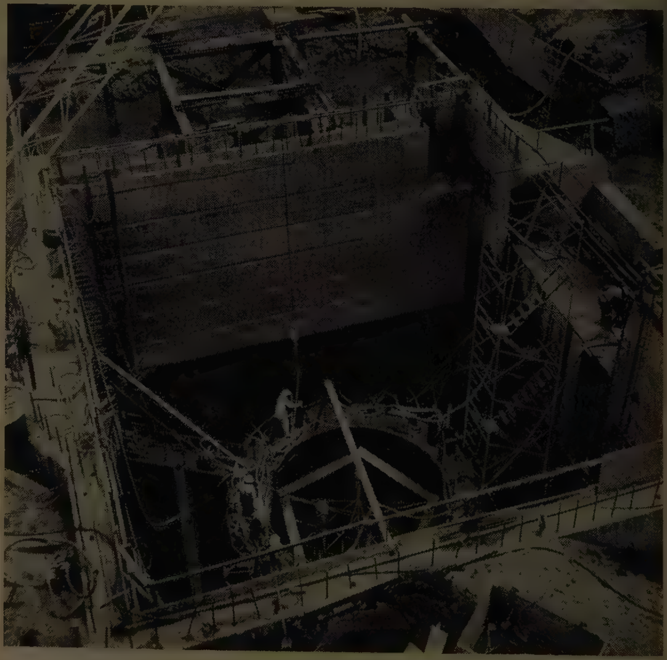
## Photo Report: Construction Progress on More Nuclear Power Projects

**When EL&P assembled a "Nuclear Progress Report" for the Nov. 1, 1961, issue, projects included were those which had been scheduled for startup in 1961. Not included were several which may, in fact, achieve criticality before some in "the class of '61," for some in the latter group have experienced delays. (Example: Fermi, where the deterioration in graphite shielding requires removal of all such shielding, at a minimum cost of $500,000.) All of the projects pictured here are scheduled for operation in '62.**

**Under construction at Oak Ridge, Tenn., AEC's Experimental Gas-Cooled Reactor will be the first civilian gas-cooled power reactor in U. S. The $40-million project will produce 22,300-ekw.**

**Preoperational system tests started last month at Pathfinder plant after installation of reactor pressure vessel, shown being moved into reactor building at Northern States Power Co. site.**

**Big Rock nuclear power plant of Consumers Power Co., shown in artist's conception, is expected to be completed in fall of '62.**



**Near Eureka, Cal., at site of PG&E's Humboldt Bay plant, hube below-ground caisson will contain reactor. Project was over 25-percent complete at end of summer, with scheduled operation a year away.**

## pdates every account...every day

Daily account register created as a by-
product of daily activity.

Up-to-date statistics available to man-
agement on demand.

Credit and past due follow-ups signalled
automatically.

Connecticut Light & Power also uses its
BM 7070-1401 System to handle com-
lete installment accounting for its appliance sales. In addition, the company is planning to put the same system to work on a variety of engineering and research studies, forecasting, budget, and general accounting.

You'll find there's an IBM Data Processing System to meet *your* needs. The Utilities Specialist at your local IBM office will be glad to give you complete details.

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## ECONOMIC OUTLOOK

*BY A. C. FARMER*
*ECONOMIC CONSULTANT*

# ECONOMIC LAWS CONTROLLING THE AMERICAN ECONOMY

In discussing the report of the Commission on Money and Credit, it was pointed out that today no economic laws universally are recognized or have general acceptance among modern accredited economic experts.

It therefore will be desirable to point out what these laws are, how they operate, and why they operate.

Basically the controlling economic laws in the American economy are financial.

The following statements deal with various economic conditions and all of them have their explanation in changes that take place in financial factors:

### Economic Stability

Excessive debt causes economic instability. In the past when —

Net private debt equals or exceeds three times the total volume of money in the economy a critical point is reached,

and when

Bank loans at all commercial banks equal or exceed 1.5 times net demand deposits a critical point is reached.

The critical points are empirical, but can be expected to prove quite accurate. Common sense says debt cannot be expanded indefinitely without running into trouble sooner or later.

When bank loans at all commercial banks expand, spending increases, since money is borrowed to spend on a project.

Under the operation of the Banking System of America, bank loans constitute, in practice, the chief stimulation of general business activity.

If monetary conditions are such that an expansion of bank loans can be anticipated, it is possible to forecast an uptrend in general business activity.

A contraction of bank loans results in a contraction of business activity.

Forecasts of a business reaction can be made when monetary conditions will result in a contraction of bank loans.

### Federal Reserve Discount Rate

A reduction in the Federal Reserve Discount Rate makes money cheaper to borrow. If reductions are made in the Federal Reserve Discount Rate, an expansion of bank loans will occur when the rate reaches a low enough point to encourage the borrowers. A business boom then will get under way.

An increase in the Federal Reserve Discount Rate makes money more expensive to borrow. If increases are made in the Federal Reserve Discount Rate, the borrowing of money will slow up after a point is reached which is high enough to discourage the borrowers. A business recession then will take place.

### Economic Danger Signals

These are the economic danger signals:

1. Net private debt increasing at a rate faster than the total volume of money in the economy.
2. Bank loans at the commercial banks increasing at a rate faster than the net demand deposits—and finally exceeding the net demand deposits.
3. Time deposits increasing at a rate faster than the net demand deposits and finally exceeding the net demand deposits.
4. The appropriation of money in the pursuit of domestic objectives and foreign aid with utter disregard of the money that is available nationally for this purpose without the use of the printing press.

The fact that makes financial forces as dominant as they are today in American economy is the Federal Reserve Act which became law in December 1913, with the deliberate purpose of providing an elastic currency for the use of business and industry. Without the provisions that permit vast expansion or contraction of the purchasing power — money — in the economy, financial forces still would be highly important but not exclusively so as they are today.

The creation and introduction of billions of new dollars into the economy can have a great stimulating effect on general business activity, or the withholding of such stimulation can have an opposite effect. Yet political actions by Congress can do exactly as stated by making use of the central banking system to bring about guaranteed loans.

These facts are true —

1. Vast sums of new money introduced into the American economy provide the most powerful stimulant that exists.
2. This type of activity has been taking place at an accelerated rate since the end of World War II.

When economists meet to discuss the economic outlook, this phase of the problem invariably is overlooked, but financial forces still remain dominant and will so remain as long as the large-scale expansion and contraction of money is continued with the help of the elastic currency provided under the Federal Reserve Act.

Failure to recognize these facts results ultimately in an accumulation of an excessive amount of private debt and ultimately in a breakdown of the economy.

## ORDON EVANS PLANT

*A careful survey of your plant by a qualified consulting engineer could show ways of making substantial savings in power costs.*

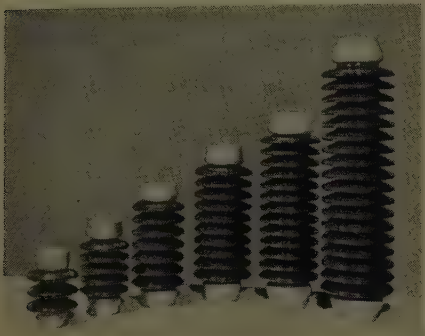
**RILEY**

STEAM GENERATING AND FUEL BURNING EQUIPMENT

# NEW PRODUCT DESIGN

## Hi-F Station Posts

A new series of Hi-F (high-efficiency) station post insulators in a light weight, functional design for normal duty switch and bus support is being offered by **Lapp Insulator Co., Inc.**



Hi-F station posts are available in six sizes, 7.5, 15, 23, 34.5, 46 and 69 kv with cantilever ratings of 1000 lbs. (in both upright and underhung positions), a strength adequate for almost all present substation use, says Lapp. In other mechanical ratings and in all electrical characteristics Hi-F station posts match the EEI-NEMA values for station posts, according to the company.

*Circle item #1 on reply card*

## Condensaire Equipment

Condensaire equipment for condensing and removing water and volatile acids from transformers is available from the **Westinghouse Electric Corp.**

This equipment reduces the deterioration of oil, maintains dielectric strength and retards corrosion in both the older-type free-breathing and modern sealed transformers. In removing the moisture and certain volatile organic compounds formed by oxidation, the insulation is protected and the life extended.

Condensaire equipment consists of a metallic inverted cone-shaped hood assembly which can normally be bolted on the existing hand-hole cover boss. A heavy gasket insulates this conical hood from the main transformer cover so that the hood is always cooler than the main cover.

*Circle item #2 on reply card*

## Improved Demand Recording

An improved method of recording electric demand utilizes a pulse generator and solid state amplifier manufactured by the **Sangamo Electric Company.** This new demand metering equipment can be used with Sangamo two-and three-stator meters and the Digital Demand Recorder. The pulse generator and amplifier, designated type M-1, do not have contacts or relays and are designed throughout with high reliability components, Sangamo reports.

In addition,. the type M-1 pulse generator and amplifier allow more pulses per revolution of the meter disk, while minimizing friction imposed on the moving system. Units are available that will deliver up to 100 pulses per minute. Two cadmium sulfide photo-conductive cells are employed in the generator to initiate pulses.

*Circle item #3 on reply card*

## Poletop Disconnect

**The A. B. Chance Co.** is introducing a poletop disconnect with an extruded "bulb-channel" aluminum base. The switch is designated type M2A. The aluminum base is one-third the weight of comparable steel bases and offers maximum resistance to corrosion. The "bulb-channel" shape gives the necessary rigidity and strength required during opening and closing of the switch blade.

The switches are available with voltage ratings of 7.8, 15 and 27 kv, 200 and 400 amp.

*Circle item #4 on reply card*

## Network Transformers

A completely redesigned line of smaller, lighter network transformers has been announced by **Kuhlman Electric Co.** In units of 15 kv and below, high voltage coils are wound directly over the low voltage windings; disc-type coils are used above 15 kv to achieve reduction in size and weight in comparison with conventional designs.

*Circle item #5 on reply card*

## MANUFACTURERS DEVELOPMENTS

### ew Testing Center For uyed V Aluminum Towers

Michael Flynn Manufacturing ., Philadelphia, Pa., is construct- g a new test center for testing yed V aluminum towers. The nter is said to be the only facility the U. S. specifically built for sting guyed aluminum structures. occupies an area of more than ,000 sq ft, and will be available any utility company for testing.

Designed for testing aluminum wer prototypes, the Flynn center ll be set up to apply (1) trans- rse loads, (2) vertical loads, (3) ngitudinal loads, and (4) broken re loads representing a cable ilure in service. Testing facilities the center currently include a 5-ft tower for use as a load ap- ication system, and a 100-ft cross m test bed to test the cross arms dependently of the towers.

Also available is a 100-ft test bed for testing tower legs. Under construction are five additional 120-ft towers that will be used for testing guyed structures.

### Two Firms Join To Produce Low Cost Piping Materials

A complete "package" of corrosion-resistant piping materials is being made available as the result of a license recently awarded The Babcock & Wilcox Co. to produce and sell welding fittings and flanges of Yoloy steel to match the Youngstown Sheet & Tube Co. piping of the same alloy.

Yoloy is an alloy which, according to an announcement by the two concerns, is lower in cost and resists corrosion better than wrought iron. It was developed by Youngstown, producers of seamless and continuous-weld Yoloy pipe.

### ew Drying Facility Boosts sulation Quality at A-C

Electrical insulation for Allis- nalmers power transformers, pro- iced at its Terre Haute (Ind.) ant, is conditioned by what is id to be one of the finest vacuum ying systems in the world. The ying chamber equipment, de- gned and supplied by the F. J. okes Corporation, Philadelphia, combines the effects of vacuum and automatically controlled heat under strict regulation to insure a high quality electrical insulation.

The drying chamber measures 18 ft by 27 ft and is 26½ ft high. It is designed for full vacuum application and is structurally reinforced with 21-inch W.F. I-beams on 14½-inch centers. As many as five power transformers can be processed in the chamber at one time.

Drying cycle for this vacuum drying equipment at Allis-Chalmers Terre Haute (Ind.) Works is completed in well under 24 hours, the company reports.

RT&E Corporation, manufacturers of distribution transformers, has announced the construction in Waukesha, Wis., of a new 8500 sq ft plant addition for the exclusive manufacture and testing of single-phase and three-phase Terra-Trans up to 1500 kva ratings.

### Westinghouse To Build High-Speed Information Center

Westinghouse Electric Corp. has announced plans to establish a Tele-Computer Center near Pittsburgh. The communications and computer facility will be a high-speed information center.

"The most advanced installation of its kind, the Westinghouse Tele-Computer will constitute a pioneering step in the application of modern technology in the areas of electronic computing, communications and data transmission," Robert C. Cheek, director of the Center, said in explaining the facility. The Westinghouse Tele-Computer Center will be located on a 22-acre site in Braddock Hills borough, one mile east of Pittsburgh, and should be completed by late 1962.

### G.E. Lab Investigates Desalting Techniques

General Electric Company has begun operation of a new laboratory, devoted solely to developing ways to extract fresh water from the sea. The facility, at its Burlington, Vt., plant, will serve as the Company's engineering center for sea water distillation work.

# A statement of importance to the electric utility industr

Four years ago the first Universal Pressure boiler system went on the line. This was the pioneer installation at the Philo Plant of Ohio Power Co. (AEP System).

Today, 16 Universal Pressure boiler systems—totalling 6,450,000 kw—are installed or on order from Babcock & Wilcox.

During this time, the Universal Pressure boiler has become a major tool to help the industry reduce the cost of power generation. It has thoroughly demonstrated four important advantages: reduced overall plant capital costs, increased availability, increased economy, and lower maintenance costs.

1. Reduced overall plant capital costs. A Universal Pressure boile weighs 20% less than a drum unit. This means smaller foundations less building steel, faster erection.

2. Increased availability. A true once-through unit, the boiler's inherent simplicity is resulting in 95% boiler availabilities.

## out the B&W Universal Pressure boiler.

Increased economy. Ability to
ntain steam temperatures over
entire operating range improves
plant's overall efficiency.
Lower maintenance costs. After
-out, the boiler can be entered
2½ to 3 hours. Fast cold starts
hot restarts can be made with-
thermal shock.

After careful evaluation of operating results of Universal Pressure boiler sytems, we strongly recommend its use for all electric utility applications involving turbine throttle pressures 2000 psi and up. We firmly believe that a review of the UP boiler system for your specific conditions will show it as the boiler to specify for high-temperature, high-pressure service.

Your B&W representative would be glad to review the benefits of UP boilers with you on request.

The Babcock & Wilcox Company, Boiler Division, Barberton, Ohio.

**Babcock & Wilcox**

# MEN OF POWER

Kigar

**Donald F. Kigar** is the new executive vice-president of The Detroit Edison Company. He succeeds **Charles R. Landrigan** who retired last month. Mr. Kigar joined Detroit Edison as a clerk in 1926, later became manager of Construction for the company, and was named manager of union relations in 1953. He was elected vice-president in charge of union relations in 1957.

* * *

Anaconda Wire and Cable Co. has established a Utility Products Division with **Austin W. Dunham** as manager. He has been manager of utility sales since 1960. He joined the company in 1932 working principally in sales capacities since that time.

* * *

Ebasco Services Incorporated has announced the appointment of **Samuel B. Smith** as chief consulting engineer, and **Herbert L. Lowe** as consulting electrical engineer. Mr. Smith succeeds **Robert E. Pierce,** who continues with the company as a general engineering consultant. Mr. Lowe, who was chief electrical design engineer, is succeeded by **Theron C. Hoyt.**

* * *

The Bonneville Power Administration has announced that **E. L. White,** deputy chief engineer, has been temporarily assigned the duties of chief engineer. This action followed the resignation last month of **Eugene C. Starr,** chief engineer, for "reasons of a personal nature."

In 1958, Mr. Starr received the Department of Interior's distinguished service award and gold medal for distinguished service to the government in the electrical engineering and nuclear power fields.

Mr. White started with BPA in 1938, and served successively as location engineer in transmission line design, chief of transmission line design, and assistant to the chief engineer prior to his promotion in 1954 to deputy chief engineer.

* * *

Appointment of **Arch T. Hoyne** as Mid-West District sales manager has been announced by Cornell-Dubilier Electronics, a division of the Federal Pacific Electric Co. He will direct CDE sales activities in Illinois, Wisconsin, Eastern Iowa and Lake County, Indiana, and will headquarter at the new Cornell-Dubilier facilities at 2070 Maple St., Des Plaines, Ill.

* * *

General Electric has appointed **Robert M. Elsworth** manager of technical service for its Insulating Materials Department. Formerly, he was manager of material and standards for G.E.'s Service Shops Department.

Mr. Elsworth replaces **C. J. Herman,** who will be on special assignment working with General Electric laboratories on insulation systems. Mr. Herman recently completed a study of insulation systems in Europe.

Recently announced at Phoenix is the appointment of **William J. McGuckin** as manager of advertising and sales promotion for G.E.'s Computer Department. He succeeds **Roy D. Jordan** who is transferring to the department's marketing training program as senior applications instructor.

* * *

Ratcliffe

Middle West Service Company has announced the appointment of **Jack J. Ratcliffe** as manager of marketing and sales. Mr. Ratcliffe was formerly sales promotion manager of the Public Service Company of Oklahoma at Tulsa. He served in the U. S. Navy as an Ensign from 1943 to 1947 and graduated from the University of Tulsa in 1949.

* * *

Herz

Directors of Sierra Pacific Power Co. have elected Assistant Chief Engineer, **Walter J. Herz** to be assistant secretary of the firm. Prior to becoming assistant chief engineer he was supervisor of the Sierra Pacific Commercial and Sales dept.

* * *

The Wisconsin Utilities Association recently announced two executive promotions. **Charles E. Lageman** has been elected chairman of the Electric Sales Section. Elected new Chairman of the Electric Operating Section is **Harry W. Bischel.** Mr. Lageman is with the Wisconsin Public Service Corp., and Mr. Bischel is with the Wisconsin Electric Power Co.

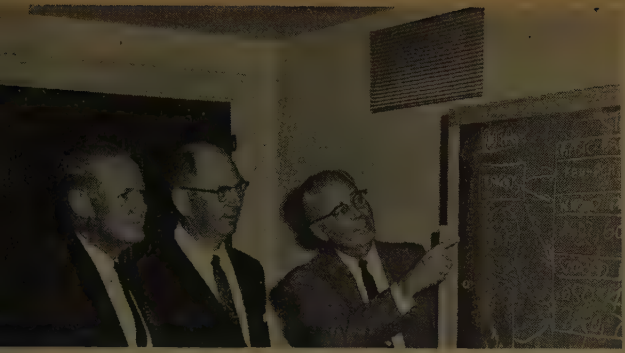
* * *

Kelley

**Wendell J. Kelley,** manager of personnel, has been elected a vice president of Illinois Power Company. He started work with Illinois Power in 1949 as an assistant engineer. Later, he was assistant to the manager of electrical operations, then system operating engineer, and in 1955 was named assistant to the vice president. He became manager of personnel in 1959, reporting directly to the president. His duties will remain the same as at present. He was in the Army Air Force in 1944 and 1945.

* * *

**Charles F. Wayham,** an industrial engineer in the Western Division operations of Central Illinois Public Service Co., has been named manager of the utility's Industrial Department at CIPS' General Offices in Springfield, (Ill.). He succeeds **Walter G. Adams,** who has been granted a leave of absence due to ill health.



At the recently held Stone & Webster Service Corp. management course, Vice President F. C. L. Sperry (right) discusses computer presentation with E. R. Lockhart, vice president, and P. J. Rempe (center), corp. chairman.

## ICRO-FILM . . .

*(Continued from page 43)*

gineering and product informa-
on to a library occupying less than
ne-half cubic foot of space. With a
eader-printer, a researcher can
elect in less than 30 seconds a page
a microfilm cartridge containing
eproductions of 2500 pages of cata-
g material. If a copy of any page
needed, it can be reproduced in-
antly.

### Used in Aerospace Industry

To make the system available to
e utility industry, the Haywood
ublishing Co. has entered into an
greement with Information Han-
ing Services, Inc., giving to Hay-
ood's newly formed Electric Light
nd Power MICRO-DATA division
xclusive marketing rights for the
SMF Microfilm Catalog File in
e electric-utility field. The VSMF
stem has been successfully used
the aerospace industry and by
. S. government agencies for the
ast two years.

The new system marketed by
L&P's MICRO-DATA division of-
rs microfilm cataloging of all
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ble from all suppliers to electric
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ewed on a one-foot square screen,
index which permits complete
ct-finding on any item and a
eader-printer that permits instant
production of anything appearing
the screen for further reference.
he latter, a semi-automatic unit
ith a built-in photo-copying re-
roduction facility, is supplied by
ecordak, a subsidiary of Eastman
odak Co.

The new Haywood MICRO-DATA division is under the direction of Charles F. Minor, Jr., vice-president of Haywood and business manager of ELECTRIC LIGHT AND POWER.

Cost estimates and complete information can be obtained by writing or calling the Electric Light and Power MICRO-DATA division, Haywood Publishing Company, 6 North Michigan Ave., Chicago 2, Illinois. CEntral 6-3690.

## BPA—

*(Continued from page 48)*

gional preference before any BPA power is made available to California. A bill involving such a provision has been drafted by BPA, and Mr. Luce is hopeful that action on it will come in the next session of Congress.

### Luce Hopeful

Meanwhile, Mr. Luce looks hopefully to the prospect of Canadian action. He notes that the U. S. could get about 2-million kw of firm power from three dams on the Columbia River to be built in a follow-through on the treaty with Canada. And, Peace River power would, of course, be additional to the Columbia River supply—with a greater likelihood of being exportable to the U. S. (Though B. C. authorities are being charged with delay of the dam-building program, they claim that development work is right on schedule, with about $400,000 a month being spent on engineering projects. Most recent move of the provincial

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government has been to acquire control of International Power and Engineering Consultants Ltd., "to facilitate the continuation of engineering for the Peace River Power Project.")

Thus, sales-minded as BPA wants to be, its future is really not very much in its own hands. Perhaps this is why the agency is now toying with a recommendation to adopt a "rolling maturity" plan that would "bring Bonneville's accounting more in line with economic facts." The plan would rearrange the amortization schedule for all facilities of the power system on a new 50-year period with each new project addition. The effect would be to reduce BPA's annual payout requirements by about $9-million a year, according to BPA's estimate.

As Mr. Warren views it, "the overall power supply picture in the Pacific Northwest remains good . . . and 1961 can be termed a year of substantial progress in the field." But, the health of BPA is of key concern to all power interest in the Northwest, and as long as the Administration is confronted with so prominent a dilemma, all is really not well out there.

---

## STORED-WATER . . .

*(Continued from page 25)*

storage systems warrant further consideration.

At the moment, however, and for the immediate future the water storage system is the most pracical. It employs design and installation methods which are familiar both to engineers and to members of the building trades. The safety and customer acceptance of the water system are well recognized.

### 3. IS THE LOW TEMPERATURE OR HIGH TEMPERATURE SYSTEM THE MOST PRACTICAL?

"Low" or "high" in the terminology used in this article are 250 F and 325 F. Atmospheric systems with an upper limit of 200 F and systems in the neighborhood of 400 F have also been considered.

For the residential system the lower temperatures appear the most practical, both from the standpoint of investment costs and customer acceptance. The 250 F and 30-psig system is presently the accepted residential standard in the hydronics industry and system components in this class are readily available at reasonable cost. This condition may change, however, if the 325-F and 125-psig systems are installed in volumes that will develop mass production of components in this class.

In the commercial-industrial field hydronic systems operating at temperatures from 250 F to 400 F are becoming increasingly common. This will in all probability increase the acceptance of higher temperature storage systems. For many systems higher temperatures will also provide greater economy.

### 4. IS THE RESIDENTIAL OR THE COMMERCIAL - INDUSTRIAL APPLICATION THE BETTER POTENTIAL MARKET?

The test systems installed are residential. This does not mean that these represent the only places of off-peak energy use.

Schools, office buildings, shopping centers, manufacturing plants, department stores, all of which have a high daytime occupancy and electric use, represent good potential markets for storage systems.

### 5. WHAT ARE SOME OF THE OTHER APPLICATIONS OF THE STORAGE SYSTEM?

An off-peak storage system can be adapted to supplement a heat pump. In some areas this is being given serious consideration.

A chilled water storage system offers advantages both to the utilities and to their customers. To the utilities in terms of improved air conditioning load factor, and to the customers in terms of reduced equipment size.

### 6. WHAT ARE SOME OF THE METHODS BY WHICH INVESTMENT COSTS CAN BE REDUCED?

Establishing realistic design procedures and criteria could do much to reduce investment costs. It is apparent that most systems are now over-designed, but how far reductions can be made is not as apparent. These are some inherent differences between a storage and an instantaneous system which can be used to advantage.

One of the principal reasons why investment costs of the five systems described were high was the necessity of using specially designed components or components which were quickly available though designed for some other purpose. This was especially true for the higher temperature systems.

Standardization of components would represent a big investment reduction. If standard tanks, heater elements and controls were available and designed to meet the requirements of the storage system, savings would result. In this same vein "packaging" which will simplify field installation would reduce total system costs. This will come about only when the demand for such components becomes great enough to justify mass production.

A reduction in storage volume, installed kilowatt and service entrance requirements can be realized by short term peak shaving. The shorter the peak, the closer the component sizes approach those of an instantaneous system.

Another possible method of investment cost reduction, is the combination on-peak and off-peak system. By designing the storage system to less extreme weather conditions and supplementing it with some on-peak heating, a large investment saving can be realized with a small increase in yearly operating cost.

The short-period storage system in combination with some practical method of the utility dispatcher controlling the load may have the greatest future potential. These methods all warrant further evaluation.

### 7. WHAT ABOUT THE FUTURE OF THE OFF-PEAK STORAGE SYSTEM?

Two requirements must be met before the off-peak storage system becomes a significant means of space heating. The electric utilities must provide a market by offering off-peak times and rates which will make the system economically appealing. The hydronics and associate industries must provide products which have customer acceptance at a first cost which is attractive to a large segment of the market. Through a continued cooperative program these conditions can be satisfied.

If the need is important enough, in time these initial ideas will develop to produce results even beyond those now foreseen.

# CALENDAR OF EVENTS

v. 26-Dec. 1—ASME Winter Annual Meeting, Statler Hilton Hotel, New York City, N. Y.

v. 30-Dec. 1—EEI Electric Space Heating and Air Conditioning Committee, Pittsburgh, Pa.

ov. 30-Dec. 1—Institute of Radio Engineers, National Conference on Vehicular Communications, Radisson Hotel, Minneapolis, Minn.

Dec. 4-5—EEI Residential Electric Heating and Air Conditioning Committee Meeting, Edgewater Beach Hotel, Chicago, Ill.

Dec. 5-7—EEI Street and Highway Lighting Committee Meeting, Tampa, Fla.

Dec. 6-8—AIME 19th Annual Electric Furnace Conference, Penn-Sheraton Hotel, Pittsburgh, Pa.

Dec. 8—EEI Industrial Relations Committee Meeting, Roosevelt Hotel, New York, N. Y.

Dec. 10-14—AIEE-IRE-ACM Eastern Joint Computer Conference, Sheraton-Park Hotel, Washington, D. C.

Dec. 12—PIP Steering Committee Meeting, Edgewater Beach Hotel, Chicago, Ill.

Jan. 18-19—PEA Electrical Equipment Committee Meeting, Benjamin Franklin Hotel, Philadelphia, Pa.

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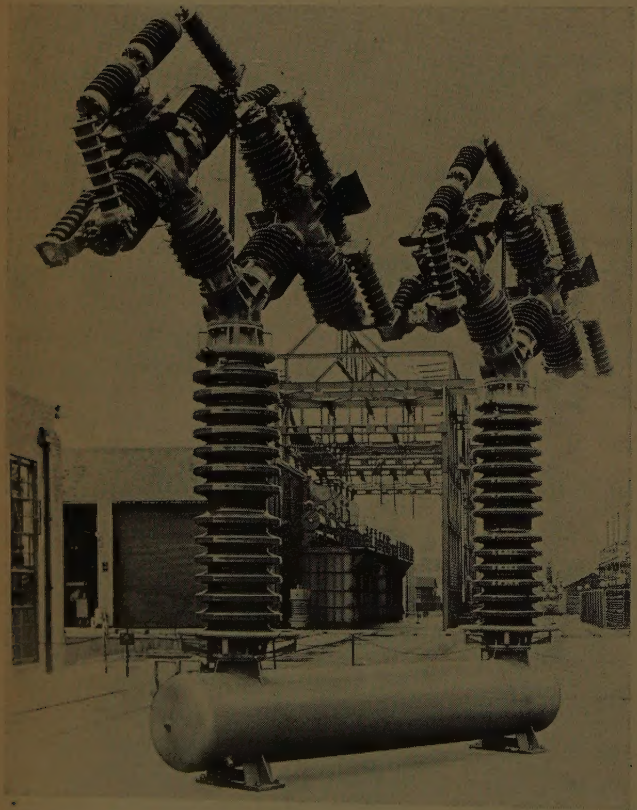
# ENGINEERING-OPERATIONS

## Highest Rated Switchgear . . .

English Electric will build 35,000 mva switchgear for a new 400 kv supergrid for the Central Electricity Generating Board in Britain. Switchgear will be installed at the new West Burton power plant in Nottinghamshire for which English Electric is already building the world's first 500 mw single-shaft steam turbo-generators.

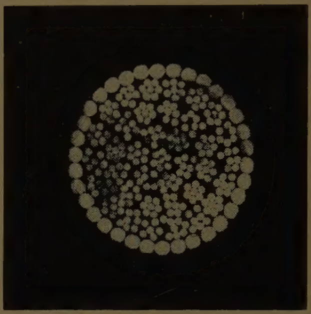
The change from 275 to 400 kv plus the higher current rating of the new supergrid will make it possible to almost treble the amount of power that can be transmitted without increasing the number of overhead lines. This is a major step in the Central Electricity Generating Board's project to keep abreast of Britain's power requirements which, it is estimated, will double every 10 years.

Worth over $4 million, the English Electric order covers thirteen 35,000 mva air-blast, frame "r" circuit-breakers, eight rated at 4,000 amps and five at 2,000 amps, with power operated isolators and associated equipment.

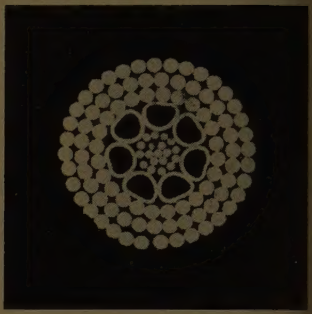


**Prototype of one phase of English Electric's new frame "r" air-blast circuit-breaker, with part of the Co.'s switchgear testing station at Stafford, England, in the background. The thirteen 35,000-mva breakers now being built at Stafford for the Central Electricity Generating Board, the highest rated yet on order anywhere, will be of this type.**

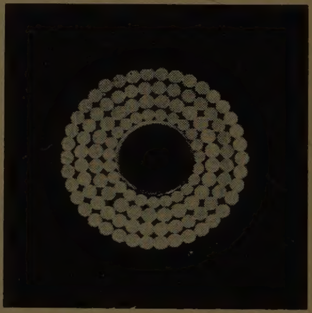
## Expanded EHV Conductors Used On Experimental BPA Line . . .



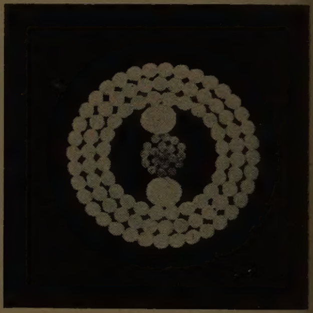
**34 x .1727" EC AL; 18/12/6/1 (7 x .0859") 5005 Al Alloy Rope Lay; Dia. 2.15"; Cu Equiv. 1,702 MCM; Wt. 2.802 lbs; RS 69,900 lbs; Strength/Wt. 24,900 ft.**



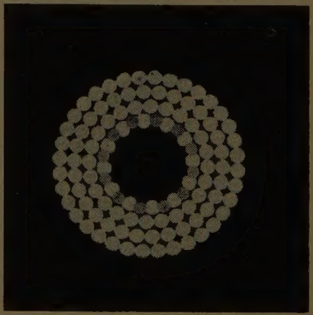
**36/30/24 x .1634" EC AL; 7⅜ x .035" Al Tubes; 12/6/1 x .0977" Galv. Steel; Dia. 2.125"; Cu Equiv. 1,750 MCM; Wt. 3.075 lbs; RS 68,800 lbs; Strength/Wt. 22,400 ft.**



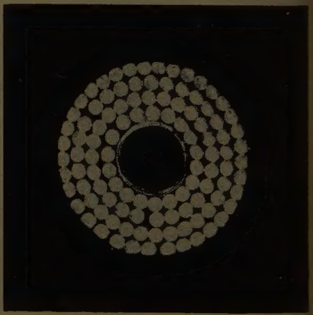
**36/30/24/18 x .165" 5005 Al Alloy; 1 x .825" Al Alloy Flexible Conduit; Dia. 2.145"; Cu Equiv. 1,621 MCM; Wt. 2.881 lbs; RS 70,600 lbs; Strength/Wt. 24,500 ft.**



**36/30/24 x .1649" EC AL; 2 x .326" EC Al Spacers; 12/6/1 x .1015" Galv. Steel; Dia. 2.150"; Cu Equiv. 1,600 MCM; Wt. 3.074 lbs; RS 69,000 lbs; Strength/Wt. 22,400 ft.**



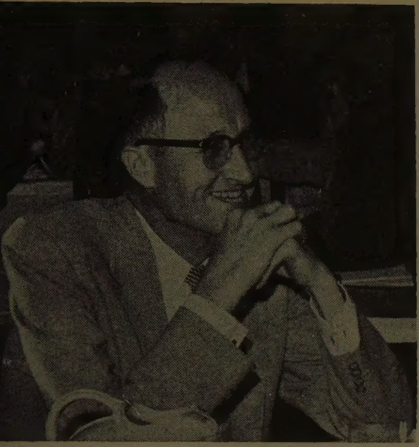
**36/30/24 x .1643" EC AL; 12 x .1443" Galv. Steel, 12 Shaped EC Al Wire Core; Diam. 2.136"; Cu Equiv. 1,707 MCM; Wt. 3.268 lbs; RS 82,800 lbs; Strength/Wt. 25,300 ft.**



**38/32 x .1591", 24 x .1706", 23 x .1377" 5005 Al Alloy; 1 x .927" Al Alloy Flexible Conduit; Dia. 2.18"; Cu Equiv. 1,603 MCM; Wt. 2.910 lbs; RS 73,300 lbs; Strength/Wt. 25,200 ft.**

For more details on BPA experimental line see EL&P Nov. 15, 1961, P. 102.

# LIGHT AND POWER LINES



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THE MAGAZINE OF ELECTRIC • UTILITY TECHNOLOGY

**What Will It All Lead To?** —It doesn't make good business sense for any equipment supplier to stay in business if he is operating consistently in the red or is only breaking even. So what must he do? Either discontinue the unprofitable business or effect major cost reductions.

Up to a point, cost reductions can be accomplished without sacrificing the design and performance margins that traditionally have given the utilities a very sizeable "plus" value in their equipment purchases.

Beyond this there is no alternative for the manufacturers placed in such a profit-squeeze position but to cut safety margins to the bone in every element of design; to trim capacities to rated values and no more; and to stop taking financial responsibility for major repairs far beyond customary guarantee periods, as has been a very prevalent practice in the past.

None of this is pleasant to contemplate, but it is a "fact of life" that our industry must face up to so long as the present chaotic marketing situation is allowed to continue; a situation in which the dominant factor in equipment awards is an unrealistic price—one that, if profitless, can *ultimately* be ruinous to both parties.

From a short-term viewpoint, this might appear to be the manufacturer's headache, but the utilities are bound to be the long-term losers.

It is unrealistic to expect that equipment with skimpy design margins will give trouble-free performance over a long period of years. Apparatus breakdowns can bring serious utility headaches in their wake; major repair expense; loss of revenue; impairment of public relations; and, for the investor-owned utilities, agitation for a takeover by public power.

Utility system-design and operating engineers are well aware that there is no substitute for equipment reliability. They also fully appreciate that as unit capacities increase the reliability of every equipment item grows in importance.

A faulty relay, for instance, can force a giant unit off the line just as easily as a small one. And cascading equipment failures can lead to a complete outage of a major portion of a system.

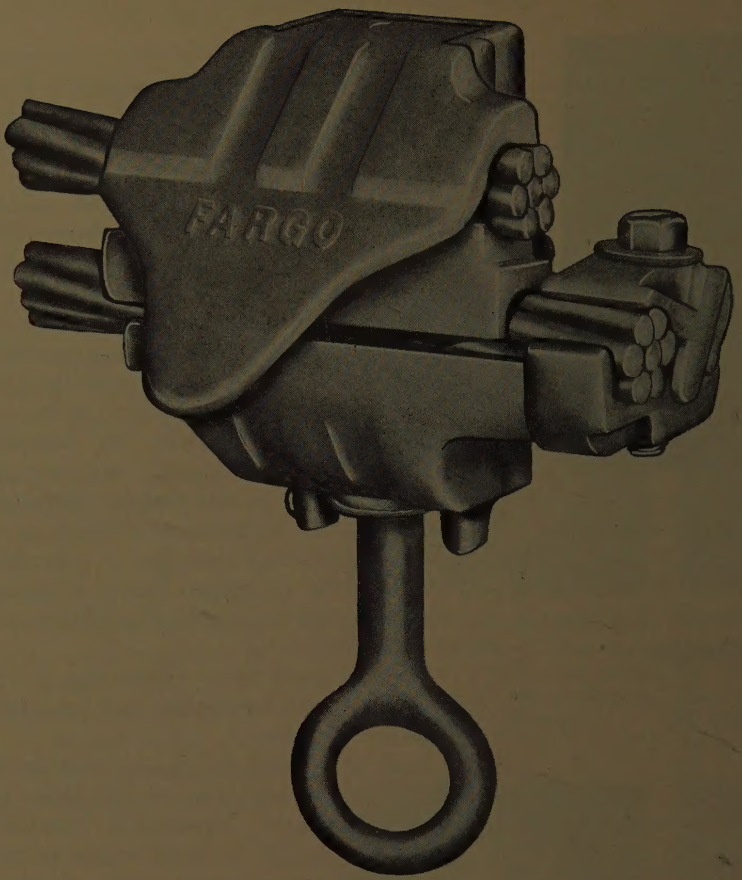
Only utility top management can apply the brakes to today's rapidly deteriorating situation in equipment buying. They can do it by conditioning all buying decisions on the long-range interests of the utility itself; that is, by making reliability and performance of equipment over the long pull the principal controlling factor in all buying decisions.

Of course this approach requires placing full reliance on the recommendations of the utility executive directly responsible for the design and operation of the system facilities. Of necessity, their first concern is preserving a high degree of service continuity.

If service continuity is to be sacrificed on the altar of immediate dollar savings in purchase of equipment, then the whole concept of living and working better electrically will have received a mortal blow.

Garrett
Publisher and Editor

P.S.—Since this situation is of such far-reaching concern to all segments of our industry, I shall welcome comments from any of our readers and shall be glad to publish their views.



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